



Behind the Wheels Podcast Transcription

BONUS Episode 3 From TMC with Nick Cross from Smithers Testing A Tell-All On Wheel and Tire Testing

ANNOUNCER

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

And I'm Doug Mason.

MIKE YAGLEY

And today we have...

DOUG MASON

Nick Cross.

MIKE YAGLEY

... Nick Cross from Smithers Testing. Nick, thank you for joining us.

NICK CROSS

Hey, thanks for having me on.

DOUG MASON

And again we're here live at TMC 2020. Anyone interested in testing, we're going to be talking about tire and wheel testing today with Nick. And Nick, give us a little background about your company, and about your experience with testing.

NICK CROSS

So, Smithers, has been testing many things but it has a long history in tire and wheel testing. They've been in the business for over 80 years and we test anything from wheels and tires to boxes, crates to medical supplies.

DOUG MASON

Oh, okay, I didn't realize you did all that extra testing.

NICK CROSS

Exactly. Yeah, we do. Anything you can think of, cradle to grave.





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DOUG MASON

Very good.

MIKE YAGLEY

So today we're going to be talking a little bit about, well, let's start within our comfort zone and start talking about wheel testing.

NICK CROSS

Right.

MIKE YAGLEY

So what wheel tests do you guys run?

NICK CROSS

We run many different wheel tests such as the SAE flavor, J2530 for passenger car, and we do some 175-impact testing and we also do some J267 for commercial truck wheel testing.

MIKE YAGLEY

So, for our listeners out there, J267 is the standard heavy truck fatigue test and there's actually two parts to that, right?

NICK CROSS

That's right. You have the radial testing, and you have the cornering part of the testing. So, the radial testing portion uses a 67-inch diameter road wheel, and you mount a tire on the wheel and you run it at a certain speed at a load rating.

MIKE YAGLEY

So basically, just simulating a tire and wheel system going straight down the road.

NICK CROSS

Straight down the road, no turns. That's right. Yeah.

MIKE YAGLEY

Okay.

DOUG MASON

This is an accelerated test, right?

NICK CROSS

This is an accelerated test, so we'll give it a load factor of 2.0 to 2.8 times load so that we don't have to run it forever. Right?

DOUG MASON

Right. Right.

NICK CROSS

Typically, going out 500,000 cycles to a million cycles depending on the requirement, but yeah, no steer, just a accelerated, straight radial load.

MIKE YAGLEY

Okay. And that's, of course, well it's got a tire and down it goes down the road basically for...

NICK CROSS

Right.

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MIKE YAGLEY

Now, SAE J267, we'll say that the 2.8 load factor which basically you take whatever is stamped on the wheel, you multiply by 2.8 and that gives you the load that you're going to be testing at.

NICK CROSS

That's right.

MIKE YAGLEY

And that's like to cycles or something. I'm sorry, no it's, yeah, SAE J267 it says to cycles is passing. That's called a...

NICK CROSS

Good wheel.

DOUG MASON

That's when you test seven wheels, right?

NICK CROSS

That's if you test seven. Yeah, it's 190 if you test two. If I remember correctly.

DOUG MASON

Right. So those are graduated based on the number of wheels you're actually testing statistically, right?

NICK CROSS

Right. Yeah.

MIKE YAGLEY

Based on the statistical analysis. I think they use like a Weibull analysis or something, which is a whole big discussion in itself, but that's... They have a statistical analysis that says, okay, yeah, if you go to that's seven and if you have two wheels going at like 190 then that's the same thing.

DOUG MASON

Yeah.

MIKE YAGLEY

You have a really good chance that if you go seven you're not going to have anything that drops out below 100,000.

DOUG MASON

Okay. So that's radial testing. What's rotary testing?

NICK CROSS

Rotary or cornering testing is simulating a truck driving in a figure eight, right?

DOUG MASON

Okay.

NICK CROSS

You're turning the truck, you're steering the truck, you're really testing the center disk part of the wheel.

DOUG MASON

And how's that test set up different than radial test?

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NICK CROSS

This testing doesn't use any tires. You install it on the machine and this machine creates a bending moment and that bending moment is derived from the load rating of the wheel. And this bending moment can be somewhere into the 20,000 foot pounds range for a truck wheel.

NICK CROSS

You'll pull on the shaft and that will deflect the wheel disc face and we spin it on the table or you spin the load around the disc face and this will end up fatiguing the center section of the wheel.

DOUG MASON

Okay.

MIKE YAGLEY

So basically, what you're doing, you take the wheel, put a disc side up-

NICK CROSS

That's right.

MIKE YAGLEY

... And then you clamp it down on the open end and then you have basically just a bar that comes down about three feet roughly-

NICK CROSS

Yep.

MIKE YAGLEY

... A little bit, I think it's 30 inches, if I remember right then you have a load down there that's actually pushing on it, trying to simulate like that force on the axle as the wheel is turning as the vehicle is turning.

NICK CROSS

That's right. There's a math figure that you do. You actually will end up using the static load radius of that to calculate your load. So, depending on what size tire you have on the truck is actually going to affect the load. With these taller tires, effectively your load is going up.

MIKE YAGLEY

Right. So basically, you use the tire height as a moment arm.

NICK CROSS

Yeah.

MIKE YAGLEY

And that's how you calculate how much force you're putting on that thing.

NICK CROSS

Exactly.

DOUG MASON

Interesting. So, tell us a little bit about the failure modes that you would see in these two types of tests. Is there a difference between the failure modes? And we're really kind of talking commercial vehicle truck here. Medium duty truck.

NICK CROSS

Yeah. A lot of our failures on radial would typically be either hand hold, your hand hold cracking or your stud hole, eyebrow cracking edge of nut. And this could be for various reasons. Either it's your backing plate is not quite... Or you have debris behind your spindle face.

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NICK CROSS

And the other thing that's kind of unique to the radial testing is you can develop a drop center crack and this cracking is in the drop well. Right? And it can either start at the valve stem, which is pretty common. Either there was a bar there or something or it can just start in the middle of nowhere.

NICK CROSS

And that is very specific to the radial side. We don't develop any drop center cracking on the cornering side. So, the weird thing with the drop center cracking, whether you start the valve or so they actually run for a little while and then it will end up leaking air out, right? Because it goes through thickness.

MIKE YAGLEY

Right.

NICK CROSS

But on the cornering side, typically we're mainly failing in the mounting area. We will see some handle cracking because you are rotating and flexing that disc. But generally, it's in the mounting flange and you're really testing the studs too at that point and time.

MIKE YAGLEY

Okay.

NICK CROSS

You get a real beating, which is another reason all of our testing starts with new studs and nuts too.

MIKE YAGLEY

That's a pretty good point.

DOUG MASON

It's a good point. We were talking about this on one of our last podcasts, just the importance of the stud, the hardware, how that's all set up properly. And obviously you're doing a new test, you're going to want to use fresh nuts and studs to ensure you've got a good joint, good clamp, the proper tension in place.

MIKE YAGLEY

So, we've talked a little bit about a radial test. We've talked a little bit about a cornering test. Anything else on tap for the wheel guys?

NICK CROSS

For commercial truck really, those are the main two. There is some impact testing that you can do or if you get into some biaxial testing also.

MIKE YAGLEY

So, the impact test on heavy truck, it's required for Japan.

DOUG MASON

That's about it, right?

MIKE YAGLEY

That's about it. And I'll take that back because there are other, I think Israel wants it.

DOUG MASON

Oh, that's correct.

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MIKE YAGLEY

There are different jurisdictions that are going to be asking for that impact test. And then what I'm also seeing is a lot of the European OEMs sell into Europe and so they'll be looking for it. So that impact test is getting more and more proliferating. Japan's a big enough market. It's sort of making an impact, no pun intended elsewhere.

DOUG MASON

Yeah.

MIKE YAGLEY

Yeah.

DOUG MASON

And really what, obviously, we said that the rotary really is looking at a steering situation, a cornering situation. The radial is running straight down the road. An Impact test, what do you got to do an impact test for? Well, we're talking about sliding or turning into a curb. You're running into something really on the side of the wheel more than anything. We really haven't developed "pothole test" for a commercial vehicle. This is more of a side impact.

MIKE YAGLEY

Right.

DOUG MASON

Right. When we talk from an impact test stand point.

MIKE YAGLEY

Right. For commercial vehicles, because the tires are so big, I don't know if a pothole test really makes sense for a commercial vehicle, but for automotive pothole testing or some sort of, I think it's called the radial impact test. It makes a hell of a lot of sense.

NICK CROSS

It does, yeah. Especially with the newer low-profile tires.

MIKE YAGLEY

So, let's move on into the tire testing.

NICK CROSS

Okay.

MIKE YAGLEY

Let's start with FMVSS. And FMVSS is the Federal Motor Vehicle Safety Standard.

NICK CROSS

That's right.

MIKE YAGLEY

And that's sort of the foundational testing for all of North America.

NICK CROSS

Right. That's correct. And with FMVSS you have your high-speed endurance, you have your typical endurance testing, you even get into plunger testing for tire strength.

DOUG MASON

And when you say plunger testing, is it plunging into the tread into the sidewall? What is plunger testing?

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NICK CROSS

Puncture testing is typically through the tread.

DOUG MASON

Okay.

NICK CROSS

FMVSS gives you the size of the plunger depending on the size of the tire. So, a truck tire would actually take a bigger size diameter pin than of course a passenger car. And this will give you an idea of the strength of that Carcass

DOUG MASON

And is that from a road hazard type of standpoint or what does that test try to simulate?

NICK CROSS

The idea behind a road hazard, I think it'll give you an idea of that, but a road hazard is never the same size, right?

DOUG MASON

Right. Exactly.

NICK CROSS

So, it's really just an idea of how much energy that that tread and that Carcass will take.

DOUG MASON

Okay.

NICK CROSS

Basically, to quantify the tire-

DOUG MASON

Okay. That makes sense.

NICK CROSS

... More mathematically than anything then the real world. So...

MIKE YAGLEY

So, the first one you mentioned there was the high-speed endurance test.

NICK CROSS

That's right.

MIKE YAGLEY

Can you tell me a little bit about that?

NICK CROSS

Basically, a tire is mounted on its nominal size wheel and it would be set up on a radial position, a 67 inch road wheel in a 95 to 105 degree chamber. And you would run it depending on the tread depth and the class of the tire. Then you would run it for so many hours per FMVSS and then you would get either a pass or a fail at the end of so many hours. And then sometimes we'd like to go on to failure after that.

DOUG MASON

What is a failure?

NICK CROSS

Failure would be anything from a tread separation to a blowout or even just tread chunking, can be a failure too.

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DOUG MASON

Okay.

NICK CROSS

So...

MIKE YAGLEY

And what's the speed that it's running at?

NICK CROSS

It depends on the tire.

MIKE YAGLEY

Okay.

NICK CROSS

So, could it be anywhere in the 80 miles an hour all the way up into the a hundred and something?

MIKE YAGLEY

Okay. Okay. I honestly didn't know that the-

DOUG MASON

A lot of truck testing at a hundred and some miles an hour.

MIKE YAGLEY

I think the trucks are a little bit lower than that.

NICK CROSS

There is a difference between the deep tread tires and of course the high-speed tires. And snow tires get tested differently too.

MIKE YAGLEY

Oh, do they?

NICK CROSS

They do. Yeah.

DOUG MASON

So, what's different about that?

NICK CROSS

The snow tires are run at a lower speed also so...

DOUG MASON

Okay.

MIKE YAGLEY

That would make sense.

NICK CROSS

Snow tires aren't necessarily meant to be driven high-speed in the middle of summer. So...

MIKE YAGLEY

So, are you using the same equipment as the radial testing, the wheel radial testing that we were talking about?

NICK CROSS

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You can, yes.

MIKE YAGLEY

Okay.

NICK CROSS

Yeah.

MIKE YAGLEY

Okay.

NICK CROSS

The big difference is the, for tire testing, the loads are a little lower, which is fine, but it's the heat, right? You have to be between that 95 and 105. That way-

MIKE YAGLEY

That's the room temperature.

NICK CROSS

That's right. Yeah. That's the room temperature and that's where the test needs to start and needs to end.

MIKE YAGLEY

Okay.

NICK CROSS

And for wheel testing, we actually like to cool the room.

MIKE YAGLEY

Sure.

NICK CROSS

Because we don't really care about the tires.

DOUG MASON

You want the tire to last.

NICK CROSS

We want the tire to last. That is our goal. Yes. So, we will generate cooler room, save on tires and try and get one tire to last.

DOUG MASON

Don't you do something special as well, you buffed the tread right off, right?

NICK CROSS

That's right.

DOUG MASON

Because that reduces the temperature.

NICK CROSS

That's right. Yeah. Knocking the tread off of the truck tires really helps the life of the tire on the wheel test. Well, typically you're going two to almost three times the rated load of that tire and we will pump up the pressure a little bit. So, we'll go 1.2 times the rated pressure. That helps. But if you get rid of that heat soak, right? Then that tread, all that rubber really holds that heat and it will just kill a tire really fast. So...

MIKE YAGLEY

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Okay. So, we talked a little bit about the high-speed endurance test. We talked a little bit about the pin.

DOUG MASON

The plunger.

MIKE YAGLEY

The plunger test, thank you.

NICK CROSS

Yep.

MIKE YAGLEY

And then what was the third one that you mentioned?

DOUG MASON

I think there was high speed endurance then normal endurance you said, right?

NICK CROSS

Yes. Right. High speed endurance, normal endurance, plunge energy. We also do some burst testing. Right.

MIKE YAGLEY

Okay.

NICK CROSS

And that can actually be applied to tires and wheels. We take a tire, we will mount it on its nominal wheel. Generally, before we do that, actually we'll measure the wheel, we'll get an inboard bead diameter, we'll get an outboard bead diameter and to make sure that the wheel is okay, falls in spec, we'll end up filling it with water.

NICK CROSS

So, a hydrostatic burst because it's a lot safer than filling it up with air. Things get exciting, right? When you're into the 300 PSI on a truck tire.

DOUG MASON

Yeah.

NICK CROSS

And generally, what we do with this is we'll fill them up with water and we'll make sure that they go a certain time over depending on the customer clients and depending on the spec. Some like three times some like two and a half times. But we also like to measure everything after the burst event happens to make sure that the wheel didn't end up in pieces afterwards. Right? Or that the tire didn't destroy itself a certain way or something like that. So that would be a burst test also.

MIKE YAGLEY

Way back in the day, and I'm probably aging myself a little bit here, I remember when they did do a test, burst test with air.

DOUG MASON

Oh man.

MIKE YAGLEY

And that tire blew-

DOUG MASON

And scared him.

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MIKE YAGLEY

... And the wheel went up so high and they couldn't see the wheel anymore. They all ran into the buildings. And then, it came down and thankfully it didn't hit anything but landed in a field nearby. Just they make that mistake once and then you move to a water system.

NICK CROSS

Yes.

DOUG MASON

I think I've also heard of another test, a cleat test or something like that?

NICK CROSS

Yeah. We do perform cleat testing or a Belgium block testing. Sometimes we refer to it as a rough road simulation. Right? So, there'd be cleats molded to a six, seven road wheel. The ones that we typically use for endurance, and it will, for lack of better words, chew the tire up. It'll beat it up. Right?

NICK CROSS

It'll cause different failures that you won't see normally on endurance testing. Right? So, because there's no events on a smooth road wheel. So sometimes we'll put four to six events, sometimes there'll be 90 degrees or they can be 180 they can be positive 45 negative 45 you can put all different shapes and styles of cleats on there to create a rough road simulation.

DOUG MASON

Okay.

NICK CROSS

And this typically happens, we'll actually, sometimes we'll Oven age the tires first and then we can throw them on these on rough road to kind of do a very accelerated test.

MIKE YAGLEY

Okay.

NICK CROSS

And that kind of...

DOUG MASON

And you're just looking for the tire to stay together?

NICK CROSS

Mainly. Yes.

DOUG MASON

Yeah.

NICK CROSS

And sometimes we'll do a hubcap testing on that rough road simulation too. So...

DOUG MASON

That makes sense.

NICK CROSS

Because chances are it's probably the hubcaps going to stay on a smoother road. Right? But when you hit them.

DOUG MASON

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Yeah. If it comes off there, you've got a problem.

NICK CROSS

Right. When you hit that pothole in town, that's when you really want it to stay on. So...

MIKE YAGLEY

Yeah. I think that's getting interesting.

NICK CROSS

Yeah. Another test we do too FMVSS wise, we do some bead unseating and this is where we take the tire and we have a shoe and we will actually push on the sidewall of the tire and we measure at what force that that bead will unseat itself. It's a pretty neat machine that you do.

NICK CROSS

So you actually end up mounting this tire unlubricated after measuring the bead seats and everything. And you'll gather the force that it takes to, like I said, to push the bead off to where you'll, unseat the bead and release all the pressure.

DOUG MASON

And what does that try to simulate?

NICK CROSS

That could be a simulation of you going into a curb possibly. But I think it's more of a check to make sure that the bead and overall design of the tire, all of your tolerances and everything are in sync with the tire.

DOUG MASON

Okay. That makes sense.

NICK CROSS

Because if your bead's bigger than the nominal diameter that's supposed to be, there's potential that you could, right unseat a little easier.

DOUG MASON

Would that even be possible? Unseating from like a hard turn or something like that?

NICK CROSS

There's a possibility, if it's low enough it's possible. So, there is a minimum set standard of pressure and I would say that there's probably the theory behind that.

DOUG MASON

Yeah.

MIKE YAGLEY

Since most of our listeners are going to be in the maintenance side of the business, they're not really into testing so much. I wanted to take a minute and sort of bring this to what's meaningful to them. We've all been in the business for a while. The whole point of testing is to try to simulate what happens in the field and there's a lot of work that has happened over decades to try to look at the things that happen in the field and recreate those problems in a lab environment.

MIKE YAGLEY

That's why, when we start talking about an accelerated test, accelerated speed testing or we talk about the burst tester, these are all things that at one point or another were deemed to be an important enough field failure to try to predict it in a test environment.

MIKE YAGLEY

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Every one of these tests cost money, to develop the test machines to cost money to run this, all the different things that go into it, but they're there for a reason. And this is all about what happens out in the field.

DOUG MASON

And it's all about safety.

MIKE YAGLEY

It's all about safety.

DOUG MASON

Again, we were going back to safety, ensuring that the products that are going out in the field will, from my tire on a wheel standpoint, obviously meet with the customer requires from a performance but also from a safety over the life of the park.

MIKE YAGLEY

Right. Yep. And so, as we walk through these different tests, the reason they're there is because of something that happens out in the field. Doug, you kept bringing up the question, how does this equate to what's going out in the field? This is what this is all about. Is trying to predict what's happening on the field.

NICK CROSS

That's right. Yeah. It was used to solve a problem or a potential problem. And in the lab environment is, you want to be able to duplicate it.

MIKE YAGLEY

As best you can.

NICK CROSS

As best, we can. Who knows? 10 years from now even. Right? So, and that's why there are standards.

MIKE YAGLEY

Right.

DOUG MASON

And now I know that I was at your test lab not too long ago and you walked me into a very big room with a lot of controls. You want to tell me a little bit about what that test is?

NICK CROSS

That would be one of our newer machines that'd be a force and moment machine.

DOUG MASON

Okay.

NICK CROSS

The CT plus. Its main objective is tire testing. And specifically, the tire testing, that machine is used for modeling, typically.

DOUG MASON

Oh, okay.

NICK CROSS

It can be used for other things, but deviating a little bit from the safety part, the company is now, OEMs and everything, they're wanting to predict what that tire does before they make a bunch of them. So and this means that they can plug all this information in and make sure that that safety factor and everything else is in play. Right.

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DOUG MASON

Okay.

NICK CROSS

So, what we do with this machine is we'll get some tires in and we'll run it on there and we'll get all of the forces and moments that this tire create on the road surface.

DOUG MASON

So basically, you're running it through all kinds of road surfaces and angles and speeds and everything?

NICK CROSS

Exactly.

DOUG MASON

Okay.

NICK CROSS

Yeah. So, this machine, it'll go like 300 kilometers per hour. And this machine, actually, this machine isn't a drum either. It's a flat surface. So, you're getting a more true effect of the tire on a flat surface, not a drum. So, there is a-

DOUG MASON

So, the contact, that should be more...

NICK CROSS

More realistic.

DOUG MASON

Yeah.

NICK CROSS

That's right. And that's what they're getting to. Is they're trying to get all these forces and moments that this tire makes on that surface so they can input that data into various programs to help them further develop a tire. And this machine will go, you can steer positive and negative, you can put some camber on it too, and you can actually create a driving or a breaking event with the motor that's hooked to the back of the spindle.

NICK CROSS

So, there's a motor on the belt that you can drive that'll go 300 kilometers per hour. And there's actually a motor on the backside too. And that motor is capable of 6,000 Newton meters. Yes. So, we can really, the main thing was for developing higher performance tires. Right.

DOUG MASON

Okay.

NICK CROSS

But yeah, that machine it's big and it does a lot of things and it's pretty neat to see the data off of it.

DOUG MASON

Now, is there any other types of tire testing that you do or just tire information that you gather?

NICK CROSS

There's other tire information that we can get off of some of our machines there. One specifically would our spring rate machine.

DOUG MASON

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Okay.

NICK CROSS

So, we can get the spring rates of KZ, KX and KY and basically that's getting your spring rate vertically and horizontal to cut more for modeling. Right? You get the stiffness.

MIKE YAGLEY

So, when you say spring rate, that's the spring rate of what?

NICK CROSS

Of the mounted assembly.

MIKE YAGLEY

Of the entire and wheel assembly.

NICK CROSS

Exactly.

MIKE YAGLEY

Of the entire and wheel assembly?

NICK CROSS

That's tire and wheel assembly at a certain PSI. Yeah.

MIKE YAGLEY

Okay.

NICK CROSS

Yeah.

MIKE YAGLEY

Okay. Now, I don't know that our listeners are going to know it when you say spring rate in the Z axis, I'm assuming that that is the up and down-

NICK CROSS

Exactly.

MIKE YAGLEY

... That's the up and down spring rate. And then when you have the Y, how do you measure Y? That seems like that'd be a little tricky because measuring the spring rate of something going, it's almost like drifting, isn't it?

NICK CROSS

That's right. Yeah. We actually have a plate that's specifically designed for the machine and we end up pulling that plate out from underneath of it.

MIKE YAGLEY

Okay.

NICK CROSS

And then there's a load cell on that plate to give us those values.

MIKE YAGLEY

Oh, interesting.

NICK CROSS

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Yeah. So, we can either push it or pull it.

MIKE YAGLEY

Okay.

DOUG MASON

So, you're not only doing destructive testing, you're doing predictive testing.

NICK CROSS

Exactly.

DOUG MASON

So, people can put all of this information into their models to develop.

NICK CROSS

Yes.

DOUG MASON

Okay. That's cool.

MIKE YAGLEY

For the computer guys.

DOUG MASON

Yeah, the computer guys.

MIKE YAGLEY

Yeah.

DOUG MASON

CAE

NICK CROSS

Yeah. So also, on that machine we do footprints too. And these footprints can range from simple ink footprints to just get you a color, just a plot just to see what area that takes up. And we can do color footprints too. So, in these color footprints can range from little passenger car tires. You can see what the tire does under different pressures, how it changes your footprints, what your ideal footprint could be.

NICK CROSS

And actually a few weeks ago I've done a color footprint on a 1100 wide agricultural tire too. So yeah. We do a lot of testing like that. Anything that's different or weird just to get some more information to give to our customers.

DOUG MASON

Okay.

MIKE YAGLEY

And when you say footprint, also known as the tire patch. Right?

NICK CROSS

That's right.

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BONUS Episode 3 From TMC with Nick Cross from Smithers Testing
A Tell-All On Wheel and Tire Testing

MIKE YAGLEY

And so, when we're talking about the tire patch, every time I've talked to a tire guy, it's all about that tire patch. The inflation, everything is trying to get that maximum tire patch because it's the tire patches what gives you all the ability to stay on that road. Once you lose that tire patch, you're losing adhesion to the road. Right?

NICK CROSS

Right, right. And the big thing with the agricultural guys is, they're really trying to get that footprint pressure down so they're going-

DOUG MASON

Don't deform the soil.

NICK CROSS

Exactly. So that's why a lot of the tracks foots came out, but they're trying to get with these wider base tires to perform similar to tracks.

MIKE YAGLEY

Okay.

NICK CROSS

So, to get that footprint pressure as low as possible.

MIKE YAGLEY

All right.

DOUG MASON

They're going to put some tracks on some semi-trucks. I don't think so.

MIKE YAGLEY

Well, thank you Nick. This has been a great discussion. Doug, do you got anything more you want?

DOUG MASON

No. Unless there's any other testing that you want to share with us about truck testing of any type, but anything else is pretty much the standard testing that we've got in place.

NICK CROSS

Yeah.

DOUG MASON

Okay. No, that's great. I think this gives our listeners, I think an idea of the fact that we don't just model on what's going on, we test to predict what's going to go on in the field so that when they get either a tire or a wheel product, they know that it's going to meet the requirements that they expect.

MIKE YAGLEY

Right. It all begins with what happens in the field. You can't beat reality. The fact is that everything starts with what's happening in the field. Nick and the team there at Smithers does a great job trying to model what happens in the field and then people like us, Alcoa, and all the other wheel and tire manufacturers try and model to predict what's going to happen in that test to predict what's going to happen in the field.

MIKE YAGLEY

And so, it's that chain all trying to protect what's going to happen for our customers, how we can make things best, a good product that's going to satisfy our customers.

DOUG MASON



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Yeah. Very good. Thanks for coming along, Nick. We really appreciate it.

NICK CROSS

Thanks, Doug.

MIKE YAGLEY

Yeah, thank you, Nick.

NICK CROSS

Thank you Mike.

DOUG MASON

And we'll see you next time on Behind the Wheels with Mike Yagley, Doug Mason and our friend Dave Walters who missed it today. Thank you.

NICK CROSS

Thank you.

DOUG MASON

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DOUG MASON

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