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00:00:00,000 --> 00:00:04,000

Do not try anything you are about to see at home.

2

00:00:09,000 --> 00:00:18,000

On this episode of Mythbusters, Adam and Jamie bet the house on a hurricane survival tale.

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00:00:18,000 --> 00:00:19,000

Sweet home.

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00:00:19,000 --> 00:00:20,000

For a little while.

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00:00:20,000 --> 00:00:23,000

It's wind versus windows.

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00:00:23,000 --> 00:00:26,000

Things are going to start to get a little crazy in here.

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00:00:26,000 --> 00:00:31,000

As they unleash the awesome hour of nature at its deadliest.

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00:00:31,000 --> 00:00:33,000

We are so not in Kansas anymore.

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00:00:34,000 --> 00:00:40,000

Meantime, Carrie Grant and Tori chill out with two myths about liquid nitrogen.

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00:00:41,000 --> 00:00:42,000

That is terrifying.

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00:00:42,000 --> 00:00:48,000

First, it's the villainous movie myth of the quick freeze face that shatters like ice.

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00:00:49,000 --> 00:00:50,000

Why did I lose?

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00:00:50,000 --> 00:00:51,000

Why did I lose?

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00:00:52,000 --> 00:00:56,000

Then, could a truckload of LN2 really ruin Christmas?

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00:00:56,000 --> 00:00:57,000

Minus 200.

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00:00:58,000 --> 00:00:59,000

I can't even comprehend that.

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00:01:06,000 --> 00:01:07,000

Who are the Mythbusters?

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00:01:08,000 --> 00:01:09,000

Adam Savage.

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00:01:09,000 --> 00:01:10,000

That's the liquid data.

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00:01:10,000 --> 00:01:11,000

And Jamie Heineman.

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00:01:11,000 --> 00:01:13,000

Jamie wants a big home.

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00:01:14,000 --> 00:01:18,000

Between them more than 30 years of special effects experience.

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00:01:19,000 --> 00:01:21,000

Joining them, Tori Bellachy.

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00:01:22,000 --> 00:01:24,000

We're popping popcorn with lasers.

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00:01:24,000 --> 00:01:25,000

Grant Imahara.

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00:01:26,000 --> 00:01:28,000

And Carrie Byron.

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00:01:28,000 --> 00:01:29,000

Look mom, no hands.

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00:01:30,000 --> 00:01:31,000

They don't just tell the myths.

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00:01:33,000 --> 00:01:34,000

Come scare us.

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00:01:34,000 --> 00:01:36,000

They put them to the test.

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00:01:44,000 --> 00:01:47,000

First up, a myth fit to blow the house down.

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00:01:48,000 --> 00:01:49,000

Here's the myth.

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00:01:49,000 --> 00:01:51,000

You've got a nice house, it's near the ocean.

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00:01:51,000 --> 00:01:52,000

Are hurricanes coming?

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00:01:52,000 --> 00:01:53,000

What do you do?

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00:01:53,000 --> 00:01:55,000

Does this have to do with opening windows?

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00:01:55,000 --> 00:01:56,000

Bingo.

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00:01:56,000 --> 00:02:00,000

The theory is that if you leave the windows open, it will allow the wind to pass cleanly through the house,

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00:02:00,000 --> 00:02:04,000

creating less structural damage than if you close the windows.

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00:02:04,000 --> 00:02:05,000

Really?

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00:02:07,000 --> 00:02:10,000

Hurricanes are one of the most powerful forces in nature.

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00:02:10,000 --> 00:02:12,000

Destroying thousands of homes each year.

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00:02:13,000 --> 00:02:17,000

And where there's catastrophe, there's often controversy.

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00:02:17,000 --> 00:02:23,000

Some say that to prevent your home being blown to bits, it's best to open all your windows.

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00:02:23,000 --> 00:02:26,000

And some say to leave them closed.

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00:02:26,000 --> 00:02:27,000

What are we going to do?

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00:02:27,000 --> 00:02:29,000

Well, before we even get to the hurricane part,

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00:02:29,000 --> 00:02:33,000

I'm actually really interested in examining the structural pressures on a house,

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00:02:33,000 --> 00:02:35,000

let's say in scale.

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00:02:35,000 --> 00:02:38,000

In a wind tunnel, we make a little house, windows open, closed,

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00:02:38,000 --> 00:02:41,000

try the different configurations and see what we get.

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00:02:41,000 --> 00:02:43,000

Sounds like a good place to start.

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00:02:43,000 --> 00:02:44,000

I thought so.

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00:02:45,000 --> 00:02:51,000

Flash forward a day to NASA's Ames Research Center, just across the bay from M5.

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00:02:53,000 --> 00:02:59,000

Senior research engineer Kurt Lawn has kindly offered his miniature wind tunnel for testing.

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00:03:01,000 --> 00:03:02,000

There we go.

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00:03:02,000 --> 00:03:03,000

Perfect.

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00:03:03,000 --> 00:03:06,000

All right, just bolt it down and we're ready to go.

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00:03:06,000 --> 00:03:09,000

But ready to go with what exactly?

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00:03:09,000 --> 00:03:15,000

This may look pretty cool, but I assure you that yesterday this was nothing but a big sheet of steel with potential.

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00:03:16,000 --> 00:03:22,000

And it didn't take long for that steel to fulfill its potential, transforming into a small-scale house.

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00:03:22,000 --> 00:03:27,000

Like most simple homes, it's got four walls, a roof and some windows.

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00:03:27,000 --> 00:03:30,000

But this is an engineering marvel.

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00:03:30,000 --> 00:03:36,000

All of the walls of the house have a hinge along the bottom, and that allows the wall to flex in and out.

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00:03:36,000 --> 00:03:42,000

Now, because we've attached a cylinder inside that's filled with a blue fluid, when the wall moves in or out,

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00:03:42,000 --> 00:03:49,000

it pushes that cylinder up or down, which moves this blue fluid in the hose up or down.

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00:03:49,000 --> 00:03:58,000

Each wall and the roof is color-coded, so the blue water runs up a clear tube to match a corresponding color on the big board.

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00:03:59,000 --> 00:04:06,000

That way, they can see exactly which wall is feeling the force of the wind with windows open or closed.

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00:04:06,000 --> 00:04:14,000

This steel box right here is our test platform for monitoring pressures on a house when the windows are open or closed in a windstorm.

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00:04:14,000 --> 00:04:20,000

It's got four windows, one on each side, and we can open them by removing any which ones we want.

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00:04:21,000 --> 00:04:29,000

Time to test the relative pressures from several hurricane window scenarios, and we'll kick it off with a total lockdown.

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00:04:29,000 --> 00:04:35,000

Now, this test is with all windows closed, and this will be our baseline for all the other testing.

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00:04:37,000 --> 00:04:43,000

Kurt starts the section, raising the wind speed in an instant to 60 feet per second.

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00:04:45,000 --> 00:04:48,000

The tail of the turbulence couldn't be more clear.

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00:04:49,000 --> 00:04:54,000

With all windows closed, the front wall bore the brunt of the blast.

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00:04:54,000 --> 00:04:57,000

The roof began to lift, and the blue water went wild.

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00:05:00,000 --> 00:05:04,000

That's exactly what we'd expect. I think we're good. We can bring it down.

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00:05:04,000 --> 00:05:07,000

That's perfect! Let's cut it.

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00:05:08,000 --> 00:05:13,000

So they stopped the mini hurricane, resetting the tiny house with all windows open.

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00:05:14,000 --> 00:05:20,000

So the myth is that leaving your windows open in a hurricane will result in less structural damage to your house.

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00:05:20,000 --> 00:05:29,000

If this myth is true, when we run this test with all the windows of our test house out, we should see a lot less movement of all the sides.

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00:05:29,000 --> 00:05:33,000

Once again, Kurt cranks the breeze up to 60 feet per second.

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00:05:35,000 --> 00:05:41,000

And the movement, as predicted, is minimal. The walls and the water barely budge.

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00:05:43,000 --> 00:05:45,000

That's coming down just to the hair.

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00:05:45,000 --> 00:05:49,000

Yeah. A lot less stress with the windows open.

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00:05:49,000 --> 00:05:50,000

Yep.

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00:05:50,000 --> 00:05:59,000

So, windward side pushed in 8.5 inches, a lot less than last time. The roof pushed up just a tiny bit.

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00:05:59,000 --> 00:06:01,000

Everything was less.

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00:06:01,000 --> 00:06:04,000

Everything was less with the windows open rather than closed.

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00:06:04,000 --> 00:06:10,000

And that's good news for the myth. With all windows open, some of the wind blew clean through the house.

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00:06:10,000 --> 00:06:14,000

Less pressure on the walls and roof should mean less damage.

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00:06:14,000 --> 00:06:23,000

It turns out that in this test, the least amount of stress on your house will result from you opening all of your windows.

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00:06:23,000 --> 00:06:24,000

Hmm.

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00:06:24,000 --> 00:06:33,000

Indeed. The small scale tests were great indicators, but we need to see how those pressure changes translate into real damage.

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00:06:33,000 --> 00:06:39,000

Adam and Jamie know they'll have to upscale the house and bring on the hurricane.

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00:06:41,000 --> 00:06:55,000

At minus 320 degrees Fahrenheit, liquid nitrogen turns the soft and supple, like flowers or ripe fruit, into something brittle enough to shatter.

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00:06:55,000 --> 00:07:02,000

Anything that potent attracts its fair share of folklore. And we're testing two of the fables.

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00:07:03,000 --> 00:07:11,000

Let's talk about shattering frozen heads. Now, this scene's a little graphic, so I doubt they're going to show it.

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00:07:11,000 --> 00:07:18,000

Okay, well how about I describe it instead. During the movie, Jason 10, Jason takes a girl's head, dunks it in liquid nitrogen for 5 seconds,

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00:07:18,000 --> 00:07:23,000

and then smashes it against a counter so it shatters into a million pieces just like ice.

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00:07:23,000 --> 00:07:28,000

The original scene is too grim to show. So here's a cartoon compromise.

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00:07:28,000 --> 00:07:38,000

There's no doubt this would ruin your day, but could a 5 second dunk freeze a warm face so fast it explodes on impact.

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00:07:38,000 --> 00:07:45,000

Well, it sounds like our testing is going to come down to two things. First, does organic material with high water content shatter like ice when frozen?

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00:07:45,000 --> 00:07:50,000

And second, does it only take 5 seconds to freeze it, or is it even longer?

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00:07:50,000 --> 00:07:54,000

Well, I doubt anybody is going to volunteer for this experiment, so we're going to have to make our own heads.

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00:07:54,000 --> 00:08:01,000

So why don't we get some real human skulls? We'll make some ballistic gel heads, so that way it's very similar to the water content of a human being.

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00:08:03,000 --> 00:08:10,000

Carrie sources the skulls from the bone room. She knows they all have to be small enough to fit inside a mold of her head.

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00:08:12,000 --> 00:08:13,000

I think I'll take these three skulls right here.

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00:08:13,000 --> 00:08:14,000

Okay.

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00:08:14,000 --> 00:08:20,000

So here's the plan for these crash test heads. They'll need the first for an unfrozen control test,

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00:08:20,000 --> 00:08:28,000

and the second for that crucial 5 second dip in liquid nitrogen. The third is a just in case backup.

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00:08:28,000 --> 00:08:37,000

Normally when we do a head cast, we use alginate, and it takes a short amount of time to set up. This time we're using a silicone that is safe to put on the skin.

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00:08:37,000 --> 00:08:45,000

So I'm going to have plenty of time to play with it, and when we're done, we have the mold. We don't have to go and make a cast and make a mold of that.

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00:08:45,000 --> 00:08:47,000

I mean, it's like, it's a one shot deal.

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00:08:48,000 --> 00:08:55,000

What I'm doing right now is I'm greasing up your face, so that way the silicone doesn't stick to all the little hairs on your face.

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00:08:55,000 --> 00:08:59,000

Otherwise, we're basically going to be waxing your entire face.

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00:09:00,000 --> 00:09:04,000

Best if Tori stops talking, or Carrie stops listening.

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00:09:04,000 --> 00:09:07,000

I'm not nervous. I'm just a little greasy.

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00:09:07,000 --> 00:09:12,000

The silicone sludge is ready, and even if his bucket skills are less than perfect,

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00:09:13,000 --> 00:09:20,000

Let's acknowledge the massive loss to the world of professional cake frosting.

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00:09:20,000 --> 00:09:26,000

Right now I just want to make sure I get an even coat over her entire face, so we get a good impression.

122

00:09:28,000 --> 00:09:32,000

As Carrie's rolled outside to stiffen up in the sunlight.

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00:09:32,000 --> 00:09:36,000

How's that feel? Good. Good.

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00:09:37,000 --> 00:09:42,000

Grant starts work on a pneumatic hammer to smash those frozen faces.

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00:09:42,000 --> 00:09:50,000

Okay, so here's the idea. Rather than smash the facing of the counter, we bring the counter to the face, hence this wide, flat head on the hammer.

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00:09:50,000 --> 00:09:56,000

Now, you might be saying to yourself, oh, all this is overkill, but just imagine.

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00:09:56,000 --> 00:10:03,000

If we actually get these faces to freeze, all that soft, squishy flesh could turn into real shrapnel.

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00:10:03,000 --> 00:10:08,000

So we're going to use this to perform the test remotely, and we will be safely behind glass shields.

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00:10:08,000 --> 00:10:13,000

Okay, tomato at 20 psi in three, two, one.

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00:10:14,000 --> 00:10:20,000

Oh, that's perfect speed and perfect power. Good, great. Let's smash some heads.

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00:10:20,000 --> 00:10:27,000

But will a five second dump in liquid nitrogen cause a face to smash like frozen fruit?

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00:10:28,000 --> 00:10:32,000

Still to come, Adam and Jamie raise the stakes in Florida.

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00:10:33,000 --> 00:10:37,000

But next, those frozen heads take a serious bash.

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00:10:37,000 --> 00:10:39,000

That looks like it hurt.

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00:10:46,000 --> 00:10:50,000

Carrie, Tori and Grant are almost ready to test a morbid movie stunt.

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00:10:50,000 --> 00:10:57,000

Can liquid nitrogen really be used to rapidly freeze human flesh so it shatters like ice?

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00:10:57,000 --> 00:11:00,000

Grant's built the smash.

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00:11:01,000 --> 00:11:05,000

While the others work on a life like mold for the various test heads.

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00:11:05,000 --> 00:11:10,000

Carrie's been wrapped, plugged, frosted and baked.

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00:11:10,000 --> 00:11:12,000

And now she's done.

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00:11:12,000 --> 00:11:14,000

That's good she's laughing.

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00:11:15,000 --> 00:11:17,000

But not for long.

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00:11:17,000 --> 00:11:24,000

And usually when I've gotten a face casting, you can kind of blow air into the casting and it goes, whoops,

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00:11:24,000 --> 00:11:26,000

and then you can pull it off really easily.

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00:11:26,000 --> 00:11:32,000

So I blew into the casting and went, and my lips stuck to it.

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00:11:32,000 --> 00:11:40,000

Despite Tori's due diligence, some of the silicone is sticking to Carrie's face, pulling on her skin and eyebrows.

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00:11:40,000 --> 00:11:42,000

It's like a band-aid, you just gotta rip it off.

148

00:11:42,000 --> 00:11:46,000

I'm just kidding, I'm kidding, I'm not gonna do that.

149

00:11:46,000 --> 00:11:50,000

Where less cool heads might panic, Carrie holds it together.

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00:11:50,000 --> 00:11:54,000

She knows that if the mask is damaged, they'll have to start over.

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00:11:54,000 --> 00:11:56,000

Ready? Here we go.

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00:12:00,000 --> 00:12:02,000

Finally, freedom.

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00:12:02,000 --> 00:12:05,000

But just as they feared, it comes at a price.

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00:12:05,000 --> 00:12:07,000

We got some eyelashes.

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00:12:07,000 --> 00:12:09,000

But look at how cool this is.

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00:12:09,000 --> 00:12:10,000

That is terrifying.

157

00:12:10,000 --> 00:12:13,000

We have a silicone mold in your hand.

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00:12:14,000 --> 00:12:15,000

Was it worth it?

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00:12:15,000 --> 00:12:17,000

I think I might have to ice my face.

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00:12:18,000 --> 00:12:22,000

And that simple wish gives rise to a brilliant idea.

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00:12:22,000 --> 00:12:25,000

The plan as it stands needs three test heads.

162

00:12:25,000 --> 00:12:32,000

One unfrozen control, one dunked for five seconds, just like the movie, and a spare.

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00:12:32,000 --> 00:12:36,000

But why not smash another head made only from ice?

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00:12:36,000 --> 00:12:39,000

This should set the ultimate shatter standard.

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00:12:39,000 --> 00:12:46,000

You know, all the years of special effects and mold making, this is probably my first ice sculpture.

166

00:12:46,000 --> 00:12:52,000

Making an ice head is as simple as filling the mold with water and sticking it in the freezer.

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00:12:52,000 --> 00:12:56,000

Alright, so once that freezes, we'll have a Carrie ice head to smash.

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00:12:56,000 --> 00:13:04,000

Now for the challenge of building three more lifelike Carrie heads, starting with brains made from dental alginate.

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00:13:04,000 --> 00:13:07,000

Yay, more brains.

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00:13:07,000 --> 00:13:15,000

So the consistency we're making right now with water to alginate is 78% water, which is the same

consistency as the human brain.

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00:13:15,000 --> 00:13:26,000

The brains need time to set, so fast forward a few hours to the point where Tori pours the faces by filling the gap between the skull and mask with ballistics gel.

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00:13:27,000 --> 00:13:31,000

This too needs time to set, but we don't have to wait around.

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00:13:31,000 --> 00:13:37,000

Soon enough they've got three heads fit to fracture and a solid ice control head to kick things off.

174

00:13:37,000 --> 00:13:40,000

In three, two, one.

175

00:13:41,000 --> 00:13:46,000

Oh, that looked like it hurt. Nice.

176

00:13:46,000 --> 00:13:50,000

It sure did, so this is the best they can hope for.

177

00:13:50,000 --> 00:13:54,000

So that is what a frozen solid head should look like when it gets smashed.

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00:13:54,000 --> 00:13:56,000

Now we know.

179

00:13:56,000 --> 00:13:59,000

I don't even recognize her anymore.

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00:13:59,000 --> 00:14:02,000

Alright, should we move on to the ballistics gel head? Cool.

181

00:14:02,000 --> 00:14:06,000

No offense to Carrie, but this is where things could turn ugly.

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00:14:06,000 --> 00:14:11,000

This alternate control test is a head warmed up to normal body temperature.

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00:14:11,000 --> 00:14:13,000

Look how creepy this looks.

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00:14:13,000 --> 00:14:17,000

Now we need to smash it to see what it looks like unfrozen.

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00:14:17,000 --> 00:14:21,000

Once we have that data, we'll be able to compare it to the heads frozen with the liquid nitrogen.

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00:14:21,000 --> 00:14:24,000

Three, two, one.

187

00:14:33,000 --> 00:14:36,000

Oh, she looks hammered.

188

00:14:38,000 --> 00:14:41,000

Wow, that is a perfect test.

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00:14:41,000 --> 00:14:43,000

That just crushed in.

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00:14:43,000 --> 00:14:46,000

Yeah, it's just broken up the ballistics gel. It hasn't shattered all over.

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00:14:46,000 --> 00:14:49,000

We've tested the two extremes.

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00:14:49,000 --> 00:14:56,000

Now it's time to dunk head number two for five short seconds and see how it fares on the shatter spectrum.

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00:14:56,000 --> 00:14:58,000

Now what do you guys think is going to happen?

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00:14:58,000 --> 00:15:01,000

Personally, I think five seconds isn't long enough to freeze a head.

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00:15:01,000 --> 00:15:04,000

You know what? I have a feeling we're going to be shattering these faces.

196

00:15:04,000 --> 00:15:09,000

I think liquid nitrogen is really effective. Five seconds might be just long enough to pull this off.

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00:15:09,000 --> 00:15:15,000

They've built a snug box with foam insulation to hold the cold of the LN2.

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00:15:15,000 --> 00:15:22,000

And they'll need to be careful. Dealing with such fearsomely low temperatures, frostbite is a real danger.

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00:15:22,000 --> 00:15:24,000

Oh, this is so wrong.

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00:15:24,000 --> 00:15:27,000

When you say go, I'll start timing.

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00:15:27,000 --> 00:15:35,000

That means long gloves, a full face mask, an apron, and a narrator saying, don't try this at home.

202

00:15:35,000 --> 00:15:38,000

Whoa! Tell me when.

203

00:15:38,000 --> 00:15:39,000

Okay.

204

00:15:39,000 --> 00:15:43,000

Oh my God, look at that! That is so clear.

205

00:15:43,000 --> 00:15:46,000

Quickly so it doesn't unfreeze.

206

00:15:46,000 --> 00:15:48,000

Go as quick as I can.

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00:15:48,000 --> 00:15:54,000

Grant predicts it won't work, but the others think you can sometimes trust in the movies.

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00:15:54,000 --> 00:16:00,000

Okay, pressure it up. 20 psi. Safety's out. Good to go.

209

00:16:00,000 --> 00:16:08,000

Okay, this is liquid nitrogen exploding head. Ballistics gel done for five seconds in three, two, one.

210

00:16:08,000 --> 00:16:11,000

Oh!

211

00:16:11,000 --> 00:16:14,000

Oh, crap.

212

00:16:14,000 --> 00:16:22,000

Grant was right. A five second freeze was too brief to turn those soft cheeks to shrapnel.

213

00:16:22,000 --> 00:16:29,000

It definitely did not shatter like ice, but on the other hand, it didn't quite smush like the room temperature head.

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00:16:29,000 --> 00:16:35,000

It was somewhere in between. So the freezing definitely had an impact on the impact.

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00:16:35,000 --> 00:16:40,000

Well, maybe to replicate the results they had in the movie, we're going to need to freeze it completely through.

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00:16:40,000 --> 00:16:41,000

Leave it in a lot longer.

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00:16:41,000 --> 00:16:45,000

Yeah, because in the movie, when her face gets hit, I mean, it just shatters.

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00:16:45,000 --> 00:16:52,000

So the five second freeze was misleading, but a five minute dunk might make all the difference.

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00:16:52,000 --> 00:16:57,000

This is why it's so important people to always have a spare head.

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00:16:57,000 --> 00:17:03,000

Whoa. That's impressive.

221

00:17:03,000 --> 00:17:07,000

This myth, at least in principle, is still up for grabs.

222

00:17:07,000 --> 00:17:09,000

Okay, that's two minutes.

223

00:17:09,000 --> 00:17:14,000

That's it. It's only been two minutes. Five minutes is going to be forever.

224

00:17:14,000 --> 00:17:17,000

So let's cut straight to the big chill.

225

00:17:17,000 --> 00:17:23,000

Whoa. That is the coolest looking thing.

226

00:17:23,000 --> 00:17:24,000

Cut it down.

227

00:17:24,000 --> 00:17:28,000

All right, here we go. In three, two, one.

228

00:17:28,000 --> 00:17:32,000

That looked more like the movie.

229

00:17:32,000 --> 00:17:34,000

That looked just like the movie.

230

00:17:34,000 --> 00:17:35,000

That was a lot better.

231

00:17:35,000 --> 00:17:40,000

Look, it's still frozen. It shattered. That's cool.

232

00:17:40,000 --> 00:17:43,000

That is disgusting.

233

00:17:43,000 --> 00:17:51,000

After a much longer soak, they've at least matched the movie, but they're not ready yet to call this one busted.

234

00:17:51,000 --> 00:17:54,000

We got the face to shatter just like in the movie.

235

00:17:54,000 --> 00:17:57,000

However, we can't bust or confirm this myth yet because let's face it.

236

00:17:57,000 --> 00:18:00,000

That was the blue six gel head, not a real head.

237

00:18:00,000 --> 00:18:03,000

I mean, there's no muscle. There's no skin holding the face together.

238

00:18:03,000 --> 00:18:06,000

We need a more accurate human analog.

239

00:18:06,000 --> 00:18:12,000

And that's not going to be pretty because Tori's thinking pig heads, which will be the ultimate test,

240

00:18:12,000 --> 00:18:14,000

but it's not for the squeamish.

241

00:18:14,000 --> 00:18:15,000

It's even got eyelashes.

242

00:18:15,000 --> 00:18:20,000

After the break, a massive wind machine kicks in to cause some real damage.

243

00:18:20,000 --> 00:18:21,000

That didn't take much.

244

00:18:21,000 --> 00:18:26,000

While the shattered face testing gets all too much for carry.

245

00:18:26,000 --> 00:18:30,000

What did I watch?

246

00:18:31,000 --> 00:18:42,000

Adam and Jamie are testing a myth that might just save your house and your life.

247

00:18:42,000 --> 00:18:47,000

Will opening every window in a hurricane lessen the damage to your home?

248

00:18:47,000 --> 00:18:53,000

Well, at NASA's wind tunnel, the small scale experiments fortified the fable.

249

00:18:53,000 --> 00:18:59,000

When we opened all the windows, we saw in that test specifically the least amount of overall pressure on our structure.

250

00:18:59,000 --> 00:19:01,000

So where does that leave us?

251

00:19:01,000 --> 00:19:07,000

Somehow we need to get from those pressure differentials we saw in the small scale testing to a real world situation

252

00:19:07,000 --> 00:19:11,000

and see what it means in terms of structural damage.

253

00:19:11,000 --> 00:19:15,000

But that leads us right back to where we're going to get a hurricane.

254

00:19:15,000 --> 00:19:19,000

Well, the simple answer to that is Florida.

255

00:19:19,000 --> 00:19:23,000

And it really doesn't matter if it's hurricane season or not.

256

00:19:23,000 --> 00:19:28,000

When you want to investigate the power of hurricane force winds, you can do one of two things.

257

00:19:28,000 --> 00:19:34,000

Either A, get yourself in the middle of a real hurricane, or B, travel to the University of Florida's hurricane research facility,

258

00:19:34,000 --> 00:19:41,000

which is where we are now, where they have the world's largest portable hurricane simulator.

259

00:19:47,000 --> 00:19:53,000

For obvious reasons, this 3,000-horsepower hairdryer is nicknamed Medusa,

260

00:19:53,000 --> 00:19:56,000

after the mythical Greek chick with snakes on her head.

261

00:19:56,000 --> 00:20:03,000

But this modern monster is way more perilous, pumping out a million cubic feet of air a minute.

262

00:20:03,000 --> 00:20:05,000

What exactly do you do with it?

263

00:20:05,000 --> 00:20:10,000

The hurricane simulator is an experimental means to create severe wind and wind-driven rain,

264

00:20:10,000 --> 00:20:14,000

so we can test buildings, utilities, and even the landscaping around your home.

265

00:20:14,000 --> 00:20:16,000

Well, what's on the menu for us today?

266

00:20:16,000 --> 00:20:22,000

We're going to dial up a Category 2 storm with wind speeds in excess of 100 miles per hour.

267

00:20:22,000 --> 00:20:23,000

Wow.

268

00:20:23,000 --> 00:20:30,000

You said it, Jamie. And the guys just can't resist a thrill of first putting their own hides in harm's way.

269

00:20:33,000 --> 00:20:38,000

Have you ever wondered what it would really be like to be in hurricane force winds?

270

00:20:38,000 --> 00:20:43,000

Well, we've all seen news footage of hurricanes when they hit land and so on.

271

00:20:43,000 --> 00:20:50,000

This is 100 miles per hour, and notice how hard it is for us to retain traction on this surface.

272

00:20:50,000 --> 00:20:53,000

You'd be like a tissue cloth in the wind.

273

00:20:53,000 --> 00:20:56,000

Wow. That is awesome.

274

00:20:56,000 --> 00:20:59,000

I was okay, but my suit's starting to come apart.

275

00:21:01,000 --> 00:21:08,000

Before Jamie gets nude for the cause, let's pre-test with a target that's much closer to scale.

276

00:21:09,000 --> 00:21:12,000

Seven years of shooting this show, and they finally got us a trailer.

277

00:21:12,000 --> 00:21:15,000

Yep. Well, let's put it to good use.

278

00:21:15,000 --> 00:21:22,000

The Saphir Simpson Scale predicts major damage to mobile homes in a Category 2 hurricane.

279

00:21:22,000 --> 00:21:24,000

Let's start it up.

280

00:21:26,000 --> 00:21:32,000

Medusa barely gets time to warm up before this caravan turns into trailer trash.

281

00:21:40,000 --> 00:21:42,000

Well, that didn't take much.

282

00:21:43,000 --> 00:21:46,000

I don't even think those things got up to half speed.

283

00:21:46,000 --> 00:21:52,000

This pipe working from hell is more than able to produce the hurricane force winds that we were looking for.

284

00:21:52,000 --> 00:21:59,000

Now, I think it's time that we build a house and put some of these open-closed window myths to a full-size test.

285

00:22:00,000 --> 00:22:14,000

So far, we've matched the movie myth of the shattered face, but it took five minutes to freeze, not five seconds.

286

00:22:14,000 --> 00:22:21,000

To silence the critics, they're retesting with a better human analogue, and Carrie's not comfortable.

287

00:22:21,000 --> 00:22:25,000

It's got muscle and skin and lots of blood.

288

00:22:25,000 --> 00:22:32,000

We're starting out with five seconds, just like the movie, and then if that doesn't work, we're moving on to full freeze.

289

00:22:32,000 --> 00:22:38,000

Whoa! It's like a deep-fried pig, except deep frozen.

290

00:22:38,000 --> 00:22:46,000

Okay, this is liquid nitrogen exploding heads pig head. Five seconds. Call it.

291

00:22:46,000 --> 00:22:50,000

All right, here we go. In three, two, one.

292

00:22:51,000 --> 00:22:52,000

Oh!

293

00:22:52,000 --> 00:22:53,000

Is it bad?

294

00:22:53,000 --> 00:22:55,000

It's not good. It's just not really bad.

295

00:22:55,000 --> 00:22:56,000

Good, you should go check that out.

296

00:22:56,000 --> 00:22:57,000

Hi.

297

00:22:57,000 --> 00:22:58,000

Oh!

298

00:22:58,000 --> 00:23:00,000

Oh, gosh, but no shatter.

299

00:23:00,000 --> 00:23:05,000

Yep, we flattened the face, but it didn't in any way shatter like the one in the movie.

300

00:23:05,000 --> 00:23:06,000

No.

301

00:23:06,000 --> 00:23:12,000

We'd like to show you the whole of the high-speed replay, but trust us, you don't want to see it.

302

00:23:12,000 --> 00:23:14,000

Suffice to say, it didn't shatter.

303

00:23:14,000 --> 00:23:17,000

Do you want to try to leave it in there a little bit longer and see if that's enough to make it

shatter?

304

00:23:17,000 --> 00:23:18,000

Absolutely.

305

00:23:18,000 --> 00:23:20,000

I think that's a great idea.

306

00:23:20,000 --> 00:23:26,000

To maximize their chances, the second head marinates for a full 15 minutes.

307

00:23:26,000 --> 00:23:28,000

Oh, that's frozen solid.

308

00:23:28,000 --> 00:23:29,000

Whoa!

309

00:23:29,000 --> 00:23:34,000

Grant pressures up and Carrie dares to take a peek.

310

00:23:34,000 --> 00:23:36,000

Two, one.

311

00:23:36,000 --> 00:23:37,000

Oh!

312

00:23:37,000 --> 00:23:39,000

What did I look? What did I look?

313

00:23:39,000 --> 00:23:40,000

Oh!

314

00:23:40,000 --> 00:23:41,000

What did I look?

315

00:23:41,000 --> 00:23:43,000

You're blitting for punishment.

316

00:23:43,000 --> 00:23:44,000

Oh.

317

00:23:44,000 --> 00:23:45,000

Oh!

318

00:23:45,000 --> 00:23:46,000

Oh!

319

00:23:46,000 --> 00:23:48,000

So what's the verdict?

320

00:23:48,000 --> 00:23:54,000

We froze this head completely solid and smashed it in no shattering happened whatsoever.

321

00:23:54,000 --> 00:23:56,000

Absolutely nothing like the movie.

322

00:23:56,000 --> 00:23:59,000

So I guess this one's busted. Thank God we're done.

323

00:23:59,000 --> 00:24:00,000

Busted.

324

00:24:00,000 --> 00:24:01,000

Busted.

325

00:24:01,000 --> 00:24:08,000

Evil viewers take note. Results of a five-second face freeze might not match your expectations.

326

00:24:08,000 --> 00:24:12,000

I know we still have a whole canister full of liquid nitrogen.

327

00:24:12,000 --> 00:24:14,000

What else can we do?

328

00:24:14,000 --> 00:24:16,000

Let's find out.

329

00:24:16,000 --> 00:24:23,000

Coming up, Adam and Jamie see if a homemade house can survive a Force II hurricane.

330

00:24:23,000 --> 00:24:26,000

Oh, Dorothy, we are so not in Kansas anymore.

331

00:24:29,000 --> 00:24:31,000

Please do not try what we do on the show at home.

332

00:24:31,000 --> 00:24:33,000

We're what you call experts.

333

00:24:33,000 --> 00:24:35,000

It's safer that way.

334

00:24:35,000 --> 00:24:44,000

Jamie and Adam have already risked losing their shirts.

335

00:24:44,000 --> 00:24:46,000

That is awesome!

336

00:24:46,000 --> 00:24:48,000

Then totaled a trailer.

337

00:24:48,000 --> 00:24:50,000

That didn't take much.

338

00:24:50,000 --> 00:24:53,000

To trial this portable mechanical hurricane.

339

00:24:53,000 --> 00:24:56,000

I think we broke part of the toilet.

340

00:24:56,000 --> 00:25:02,000

With a Category 2 wind speed, Medusa simulates a half-strength hurricane.

341

00:25:02,000 --> 00:25:11,000

So we're building a half-sized house to see if it suffers more or less structural damage with the windows open or closed.

342

00:25:11,000 --> 00:25:14,000

It's been a while since your last Amish barn raising, hasn't it?

343

00:25:14,000 --> 00:25:15,000

Yeah.

344

00:25:15,000 --> 00:25:21,000

This prefab cubby house roughly replicates a real home's proportions.

345

00:25:21,000 --> 00:25:23,000

Home sweet home.

346

00:25:23,000 --> 00:25:26,000

Yeah, for a little while.

347

00:25:26,000 --> 00:25:29,000

A half-sized shack gets a quick paint job.

348

00:25:29,000 --> 00:25:32,000

Then Adam rides the rooftop.

349

00:25:32,000 --> 00:25:35,000

I got something stuck in the crack of my butt. Can you see it?

350

00:25:35,000 --> 00:25:41,000

It's not every day you see a house deliberately put in the path of a hurricane.

351

00:25:41,000 --> 00:25:45,000

Oh, Dorothy, we are so not in Kansas anymore.

352

00:25:45,000 --> 00:25:50,000

To assess the potential damage, they'll need to turn this house into a home.

353

00:25:50,000 --> 00:25:51,000

There we go.

354

00:25:51,000 --> 00:25:58,000

Simple furniture and a surrogate victim should be good storm fodder.

355

00:25:58,000 --> 00:26:06,000

Even more essential is a whole bank of expertly installed gauges, measuring the air pressure inside and out.

356

00:26:06,000 --> 00:26:11,000

Well, here's the deal. In a few minutes, a Category 2 storm is going to hit.

357

00:26:11,000 --> 00:26:16,000

The house is going to start to shake. Things are going to start to get a little crazy in here.

358

00:26:16,000 --> 00:26:21,000

The mad hatter briefs Alice as the door mouse puts it all in perspective.

359

00:26:21,000 --> 00:26:25,000

Why is the house this big, you wonder? Why did we choose this scale?

360

00:26:25,000 --> 00:26:30,000

Well, this scale is dictated by the size of the machine behind me.

361

00:26:30,000 --> 00:26:37,000

See, this thing is pretty much the largest of its kind, and it produces a hurricane with the footprint of the cowl you see behind me.

362

00:26:37,000 --> 00:26:45,000

So in order to get accurate hurricane force winds all the way around our model, we built it exactly this large.

363

00:26:45,000 --> 00:26:46,000

Any questions?

364

00:26:47,000 --> 00:26:53,000

No, but it's high time we explain just how a hurricane can wreck your home.

365

00:26:53,000 --> 00:26:56,000

Strong winds over the roof can cause uplift.

366

00:26:56,000 --> 00:27:03,000

While depending on the building, horizontal pressures can cause racking or sliding.

367

00:27:03,000 --> 00:27:09,000

And if the house can't rack or slide, it might just overturn.

368

00:27:09,000 --> 00:27:19,000

Adam and Jamie are now ready to fight out if those pressure differentials they saw in small scale translate to real structural damage in large scale.

369

00:27:19,000 --> 00:27:26,000

They'll start with all windows open, which should subject the house to the least amount of pressure.

370

00:27:26,000 --> 00:27:30,000

Alright, windows open? Windows open. Let's do it!

371

00:27:33,000 --> 00:27:38,000

Mendoza kicks into life and soon starts blowing with a vengeance.

372

00:27:40,000 --> 00:27:44,000

The grass starts to flutter. The stick on shingles are ripped from the roof.

373

00:27:44,000 --> 00:27:51,000

And the drapes are almost blown away as the wind speed approaches then passes 100 miles per hour.

374

00:27:59,000 --> 00:28:05,000

After two minutes, Jamie pulls the plug. As expected with windows open, the house hasn't budged.

375

00:28:07,000 --> 00:28:09,000

Hey, it's not as bad as I thought.

376

00:28:11,000 --> 00:28:12,000

She's still sitting in her chair.

377

00:28:12,000 --> 00:28:18,000

Yeah, one of the plants fell down, one of the candlesticks fell over, but pretty much it's not so bad in here.

378

00:28:18,000 --> 00:28:20,000

Still looks like a tea party to me.

379

00:28:21,000 --> 00:28:26,000

But if the small scale results run true, the next test will be no tea party.

380

00:28:26,000 --> 00:28:30,000

They've repaired the roof and closed the windows.

381

00:28:30,000 --> 00:28:31,000

Alright, you ready?

382

00:28:31,000 --> 00:28:32,000

I'm ready.

383

00:28:32,000 --> 00:28:34,000

Alright, windows closed. Let's turn it on!

384

00:28:34,000 --> 00:28:36,000

Hang on to your hats.

385

00:28:36,000 --> 00:28:43,000

Facing a Force II hurricane at point blank range, this could be the moment our kid home turns into kindling.

386

00:28:45,000 --> 00:28:48,000

Once again, Mendoza cracks up to full speed.

387

00:28:55,000 --> 00:28:58,000

Adam helps out with a huff and a puff.

388

00:28:59,000 --> 00:29:05,000

But against all predictions, the house fails to blow down.

389

00:29:07,000 --> 00:29:12,000

Totally baffled, the boys turn to the data from the pressure gauges.

390

00:29:13,000 --> 00:29:18,000

On our exterior walls, we're almost seeing no difference between the pressure loads acting on the structure between the two tests.

391

00:29:19,000 --> 00:29:20,000

What about the interior?

392

00:29:20,000 --> 00:29:24,000

We're seeing a slight difference, but I think one could probably say that's within the noise.

393

00:29:24,000 --> 00:29:25,000

So it's negligible?

394

00:29:25,000 --> 00:29:31,000

It was negligible. In fact, really there is no positive benefit to keeping your windows open during a hurricane.

395

00:29:31,000 --> 00:29:32,000

Confused?

396

00:29:32,000 --> 00:29:42,000

Here's the thing, in our scale tests, we grossly oversized the windows proportion to the size of the house in order to exaggerate any effects that we might get so that we could clearly see them.

397

00:29:42,000 --> 00:29:52,000

But with this test, with a much more real world proportion between windows to the actual area of the house facing the wind, all those effects seem to disappear.

398

00:29:53,000 --> 00:30:00,000

Technically, that's myth busted, but in the real world, gao force winds might be the least of your problems.

399

00:30:00,000 --> 00:30:06,000

You know what I'm thinking is, wind is only one of the factors that's going to affect the structural integrity of your house.

400

00:30:06,000 --> 00:30:10,000

I mean, there's also rain and there's also flying debris.

401

00:30:10,000 --> 00:30:11,000

We need to up the ante.

402

00:30:12,000 --> 00:30:15,000

And rest assured, they will.

403

00:30:17,000 --> 00:30:21,000

Next up, the modern myth of frozen, exploding Christmas trees.

404

00:30:23,000 --> 00:30:26,000

And the strain from rain that blows mostly through the pain.

405

00:30:27,000 --> 00:30:30,000

It's not quite biblical, but it sure is torrential.

406

00:30:36,000 --> 00:30:40,000

Now for the second chilling myth of liquid nitrogen.

407

00:30:40,000 --> 00:30:43,000

Alright, exploding frozen tree, let's talk about that one.

408

00:30:43,000 --> 00:30:47,000

Okay, well the story goes that there was a leak in a liquid nitrogen processing plant.

409

00:30:47,000 --> 00:30:52,000

One of the pipes burst and liquid nitrogen started to flood down into the office.

410

00:30:52,000 --> 00:30:55,000

Now it was a holiday, so there was a Christmas tree and a bunch of decorations,

411

00:30:55,000 --> 00:30:58,000

but most importantly, the liquid nitrogen leaked onto the Christmas tree.

412

00:30:58,000 --> 00:31:01,000

And bang, explodes into splinters.

413

00:31:01,000 --> 00:31:03,000

Right, now in theory this could work.

414

00:31:03,000 --> 00:31:09,000

I mean, maybe the water inside of the tree froze and expanded and caused the tree to fail catastrophically.

415

00:31:09,000 --> 00:31:13,000

Just like us mammals, most of the mass of a tree is water.

416

00:31:13,000 --> 00:31:16,000

When water turns twice, it expands.

417

00:31:16,000 --> 00:31:24,000

And if the freezing is almost instantaneous, well it doesn't take a tree surgeon to see how that might just ruin Christmas for everyone.

418

00:31:26,000 --> 00:31:27,000

So where should we start?

419

00:31:27,000 --> 00:31:30,000

Well let's start by finding out how much water a tree contains.

420

00:31:30,000 --> 00:31:33,000

We can do a classic biology dry weight experiment.

421

00:31:33,000 --> 00:31:36,000

Alright, once we've determined that, let's get two identical trees.

422

00:31:36,000 --> 00:31:39,000

We'll take them out to the bomb range, we'll blow one up as a control,

423

00:31:39,000 --> 00:31:43,000

and the other one will pour tons of liquid nitrogen over and see what happens.

424

00:31:43,000 --> 00:31:45,000

Sounds like fun, let's do it.

425

00:31:45,000 --> 00:31:47,000

Our wood chipper's here.

426

00:31:47,000 --> 00:31:53,000

Step one is to see just how much H<sub>2</sub>O lurks inside a standard Christmas tree.

427

00:31:53,000 --> 00:31:55,000

And this will not be pretty.

428

00:31:55,000 --> 00:31:59,000

We're gonna shake the dirt off this, throw this thing into a wood chipper,

429

00:31:59,000 --> 00:32:03,000

and we're gonna take all those wood chips, throw them in pans, measure their weight.

430

00:32:03,000 --> 00:32:07,000

After that, we're gonna stick them in a low heat kiln, slowly dry them out,

431

00:32:07,000 --> 00:32:10,000

evaporate all the moisture out of them, and then measure them again.

432

00:32:10,000 --> 00:32:14,000

So instead of trimming the tree, they'll tear it to shreds.

433

00:32:14,000 --> 00:32:19,000

But every last leaf and twig must be preserved for science.

434

00:32:19,000 --> 00:32:21,000

You sure are a chipper today?

435

00:32:21,000 --> 00:32:27,000

And just in case some shards of shrubbery miss the trash can, there's a safety net.

436

00:32:27,000 --> 00:32:30,000

I think we'll be able to catch everything with this.

437

00:32:30,000 --> 00:32:33,000

It's just crazy enough to work.

438

00:32:33,000 --> 00:32:38,000

Back inside, it's time to feed this innocent conifer to the wood chipper.

439

00:32:39,000 --> 00:32:42,000

Every shred went straight in the bucket.

440

00:32:42,000 --> 00:32:46,000

Not the result you'd expect from these two, let loose with a wood chipper,

441

00:32:46,000 --> 00:32:48,000

but better luck next time.

442

00:32:48,000 --> 00:32:49,000

Awesome.

443

00:32:49,000 --> 00:32:53,000

I have to say this is definitely one of the better smelling experiments we've ever had in the shop.

444

00:32:53,000 --> 00:32:56,000

Mmm, so much better than rotting meat.

445

00:32:56,000 --> 00:33:02,000

They'll check the diminishing mass each and every hour, but that could take days.

446

00:33:02,000 --> 00:33:06,000

Tray number one, 7.4 pounds.

447

00:33:06,000 --> 00:33:09,000

Alright, 7.4, that's it.

448

00:33:09,000 --> 00:33:11,000

The oven is filled.

449

00:33:11,000 --> 00:33:13,000

Now it's time to bake our tree.

450

00:33:13,000 --> 00:33:19,000

In the meantime, there's fun to be had on the bomb range with an ill-fated control tree.

451

00:33:19,000 --> 00:33:23,000

I hate to get sappy here, but does anybody feel really bad about blowing up a tree?

452

00:33:23,000 --> 00:33:25,000

Is this what Christmas is like at JD's house?

453

00:33:25,000 --> 00:33:27,000

Hahaha.

454

00:33:28,000 --> 00:33:29,000

Oh!

455

00:33:29,000 --> 00:33:31,000

Smells great!

456

00:33:32,000 --> 00:33:36,000

Now of course we can all imagine what an exploding tree looks like,

457

00:33:36,000 --> 00:33:40,000

but in the name of science and all things cool, we're gonna do it anyway.

458

00:33:41,000 --> 00:33:48,000

The myth does call for a tree explosion, so as a point of comparison, we'll simulate that with some restraint.

459

00:33:48,000 --> 00:33:50,000

So what do we got here?

460

00:33:50,000 --> 00:33:52,000

A little deck cord? That ought to do it.

461

00:33:52,000 --> 00:33:55,000

Yeah, we could use C4, we could use all sorts of explosives,

462

00:33:55,000 --> 00:33:59,000

but I think deck cord gives us the best chance of not blowing it up to complete smithereen.

463

00:33:59,000 --> 00:34:01,000

Yeah, that's probably a good call.

464

00:34:01,000 --> 00:34:03,000

And look, it's gonna look like a Christmas tree.

465

00:34:03,000 --> 00:34:09,000

The team retreats as JD sets the firing cap, then calls in the chaos.

466

00:34:09,000 --> 00:34:12,000

Fire in the hole! Fire in the hole!

467

00:34:12,000 --> 00:34:15,000

In three, two, one, go JD!

468

00:34:15,000 --> 00:34:18,000

Oh! Oh!

469

00:34:18,000 --> 00:34:21,000

Looks like we just gave it a haircut.

470

00:34:21,000 --> 00:34:23,000

And then some more.

471

00:34:24,000 --> 00:34:30,000

This is the kind of defoliation they hope to get from a big fat blast of LN2.

472

00:34:30,000 --> 00:34:33,000

Now if liquid nitrogen can do this, I'll be impressed.

473

00:34:33,000 --> 00:34:35,000

Alright, next test, liquid nitrogen.

474

00:34:35,000 --> 00:34:36,000

Alright.

475

00:34:42,000 --> 00:34:48,000

So far Adam and Jamie have disproved the myth that it's best to open all your windows in a hurricane.

476

00:34:48,000 --> 00:34:51,000

That's exactly what we'd expect.

477

00:34:51,000 --> 00:34:56,000

The large-scale house suffered no structural damage, with windows open or closed.

478

00:34:56,000 --> 00:34:59,000

They were just too small to make a difference.

479

00:34:59,000 --> 00:35:04,000

But real storm damage might owe more to rain than it does to wind.

480

00:35:04,000 --> 00:35:09,000

Time to bring water into the picture, and the guys are currently installing the Rainmaker.

481

00:35:09,000 --> 00:35:16,000

71 spouts that will pour 40 inches per hour of rain on our house in a hurricane.

482

00:35:16,000 --> 00:35:20,000

It's not quite biblical, but it sure is torrential.

483

00:35:20,000 --> 00:35:25,000

They'll need to replicate a long-term torrent in a few short minutes.

484

00:35:25,000 --> 00:35:29,000

So Jamie adds a fire hose to the sideways downpour.

485

00:35:29,000 --> 00:35:32,000

That means we're going to dump a buttload of water onto this house all at once,

486

00:35:32,000 --> 00:35:36,000

and it should be pretty much equivalent to several days of hurricane.

487

00:35:38,000 --> 00:35:42,000

Now with the rain, I feel like if anything's going to cause some real structural damage,

488

00:35:42,000 --> 00:35:46,000

it's going to be the one-two punch of wind and rain.

489

00:35:47,000 --> 00:35:51,000

And punch number three is the flying debris.

490

00:35:53,000 --> 00:35:57,000

Adam supplies friendly fire via the lawn furniture.

491

00:35:57,000 --> 00:36:02,000

The windows get smashed early on, as they would in a real hurricane.

492

00:36:04,000 --> 00:36:08,000

It's a short storm, but they've literally thrown everything into it.

493

00:36:08,000 --> 00:36:12,000

What do you think we replicated an overnight hurricane in about 10 minutes?

494

00:36:12,000 --> 00:36:17,000

Odds are they did, so how did the Tea Party weather the deluge?

495

00:36:17,000 --> 00:36:20,000

Wow, what a mess.

496

00:36:20,000 --> 00:36:23,000

There's water everywhere.

497

00:36:23,000 --> 00:36:27,000

The best thing to do in a hurricane is to board up all your windows.

498

00:36:27,000 --> 00:36:33,000

The house itself won't be at greater risk, and you might save yourself a whole lot of heartache.

499

00:36:33,000 --> 00:36:37,000

Imagine everything you own soaked to the bone.

500

00:36:37,000 --> 00:36:43,000

The floors of your house, all of your clothes, all of your electronics, all of your paperwork.

501

00:36:43,000 --> 00:36:50,000

And then imagine that it might take you days or even weeks to be allowed back into your house to

start to salvage that stuff,

502

00:36:50,000 --> 00:36:56,000

as it slowly rots and molds and becomes completely unusable.

503

00:36:56,000 --> 00:36:59,000

Let's tell me if you still think water damage is minor.

504

00:36:59,000 --> 00:37:03,000

Will windows open or windows closed? Where do we stand on this myth?

505

00:37:03,000 --> 00:37:08,000

Well, in a Category 2 hurricane in a house built to code, no difference.

506

00:37:08,000 --> 00:37:12,000

So then it's myth busted. No help from opening your windows.

507

00:37:12,000 --> 00:37:16,000

In fact, opening your windows opens you up to a whole new world of pain.

508

00:37:16,000 --> 00:37:18,000

You've got your water damage, debris, and even looters.

509

00:37:18,000 --> 00:37:22,000

Well, if it was up to me, I'd be boarding those windows up and getting the heck out of there.

510

00:37:22,000 --> 00:37:24,000

Yeah, me too.

511

00:37:33,000 --> 00:37:35,000

Strangest explosions ever.

512

00:37:35,000 --> 00:37:38,000

This thing can explode at any moment.

513

00:37:42,000 --> 00:37:44,000

Burn a hole!

514

00:37:44,000 --> 00:37:51,000

Tori, Grant, and Carrie have slow cooked one tree, then blown up another to test a tail of liquid nitrogen.

515

00:37:53,000 --> 00:38:00,000

If the fable's true, rapidly frozen water inside the tree expands so fast, it explodes.

516

00:38:00,000 --> 00:38:04,000

But is there enough moisture to justify the myth?

517

00:38:04,000 --> 00:38:11,000

So our figures have finally plateaued, and what's left of the tree is now 33% of its original weight.

518

00:38:11,000 --> 00:38:12,000

What?

519

00:38:12,000 --> 00:38:14,000

Wow, that is a lot of water.

520

00:38:14,000 --> 00:38:16,000

Tree's two-thirds water.

521

00:38:16,000 --> 00:38:18,000

So there might actually be something to this myth.

522

00:38:18,000 --> 00:38:23,000

All right, well, let's get some fresh trees, go out to the Alameda bomb range, pour some liquid nitrogen over them, see what happens.

523

00:38:23,000 --> 00:38:24,000

All right.

524

00:38:24,000 --> 00:38:26,000

Awesome.

525

00:38:27,000 --> 00:38:32,000

So it's back to the bomb range with a brand new tree and a truckload of LN2.

526

00:38:32,000 --> 00:38:38,000

Anybody who's taken a high school chemistry class knows just how effective liquid nitrogen can be to freeze something.

527

00:38:38,000 --> 00:38:46,000

So we thought in Mythbusters fashion we'd take a small quantity, like 2,800 gallons of liquid nitrogen, and we're going to pump it through this hose.

528

00:38:46,000 --> 00:38:50,000

And out through these phase separators, where it'll separate the liquid nitrogen from the gases.

529

00:38:50,000 --> 00:38:54,000

So we'll be able to dump hundreds of gallons of liquid nitrogen over the entire tree.

530

00:38:54,000 --> 00:39:00,000

And just to check our progress, we've got this temperature probe, which should be good down to a minus 300 degrees Fahrenheit.

531

00:39:00,000 --> 00:39:03,000

We'll jam it in the trunk and watch it remotely.

532

00:39:03,000 --> 00:39:07,000

I have my doubts that this tree is going to give us any sort of grand explosion.

533

00:39:07,000 --> 00:39:15,000

If anything, maybe some of the ornaments might explode, which, you know, when I told the story later, I might say the tree exploded.

534

00:39:15,000 --> 00:39:20,000

But I'm definitely standing behind the blast shields, just in case I'm wrong, because I am often wrong.

535

00:39:21,000 --> 00:39:26,000

The frigid fog rolls in and carry braces for the big bang.

536

00:39:26,000 --> 00:39:30,000

As the liquid turns to gas, oxygen gets sucked out of the mix.

537

00:39:30,000 --> 00:39:35,000

So I'll say it again, folks. Don't get too close to liquid nitrogen.

538

00:39:35,000 --> 00:39:37,000

43.5 degrees.

539

00:39:37,000 --> 00:39:40,000

That's dropping fast. That's like 20 degrees in two minutes.

540

00:39:40,000 --> 00:39:42,000

It's dropping faster now.

541

00:39:42,000 --> 00:39:43,000

What are we at?

542

00:39:43,000 --> 00:39:46,000

16.2, heading towards zero.

543

00:39:46,000 --> 00:39:49,000

This thing could explode at any moment.

544

00:39:50,000 --> 00:39:51,000

It sure could.

545

00:39:51,000 --> 00:39:57,000

And let's note that the freezing point of water is plus 32 degrees Fahrenheit.

546

00:40:00,000 --> 00:40:04,000

We're dumping gallons and gallons of liquid nitrogen over the top of the tree.

547

00:40:04,000 --> 00:40:07,000

It looks like fog rolling down off the top of it.

548

00:40:07,000 --> 00:40:11,000

You can actually see the trunk slowly turn white and freeze.

549

00:40:11,000 --> 00:40:15,000

No tree in history ever got this chilly. This fast.

550

00:40:15,000 --> 00:40:20,000

The coldest temperature recorded on Earth is minus 146 degrees Fahrenheit,

551

00:40:20,000 --> 00:40:24,000

and this freeze shows no sign of slowing.

552

00:40:24,000 --> 00:40:29,000

We're reaching minus 200. I can't even comprehend that.

553

00:40:29,000 --> 00:40:35,000

Over the next few minutes, the tree gets much colder, pushing on to the limits of absolute zero,

554

00:40:35,000 --> 00:40:39,000

but still no explosion.

555

00:40:39,000 --> 00:40:45,000

We got the core temperature of the tree to minus 330 degrees Fahrenheit.

556

00:40:45,000 --> 00:40:52,000

If that tree were going to explode as a result of the water inside freezing, it would have.

557

00:40:52,000 --> 00:40:55,000

But unfortunately for the myth, it's still intact.

558

00:40:55,000 --> 00:40:57,000

I think we should call this and check it out.

559

00:40:57,000 --> 00:40:59,000

All right, let's call it.

560

00:40:59,000 --> 00:41:03,000

All right, Fred, go ahead and kill the liquid nitrogen.

561

00:41:03,000 --> 00:41:08,000

They couldn't get it any colder, and the tree hasn't so much as shed a leaf.

562

00:41:09,000 --> 00:41:11,000

I was really hoping this thing was going to explode.

563

00:41:11,000 --> 00:41:12,000

Check for cracks.

564

00:41:12,000 --> 00:41:15,000

Wow, not any cracks though.

565

00:41:15,000 --> 00:41:17,000

I don't see any cracks at all.

566

00:41:17,000 --> 00:41:23,000

But the whole trunk is like covered in frost, and it means it's completely been covered in liquid nitrogen.

567

00:41:23,000 --> 00:41:24,000

What should we do now?

568

00:41:24,000 --> 00:41:27,000

Well, I wonder what would happen if there was some sort of impact.

569

00:41:27,000 --> 00:41:31,000

Could you actually shatter this tree the way you do with those science experiments?

570

00:41:31,000 --> 00:41:33,000

Yeah, how about if we hit it with the shotgun?

571

00:41:33,000 --> 00:41:35,000

That sounds like a plan to me.

572

00:41:35,000 --> 00:41:37,000

Yeah, nice filing myth buster ending. I like it.

573

00:41:38,000 --> 00:41:46,000

We do like to end with a bang, and a load of buckshot just might deliver the catastrophic con of her failure we hope for.

574

00:41:46,000 --> 00:41:49,000

If anybody loves Christmas, turn your heads now.

575

00:41:49,000 --> 00:41:52,000

This just seems wrong, shooting a Christmas tree.

576

00:41:54,000 --> 00:41:58,000

Safety's off. Here we go in three, two, one.

577

00:41:58,000 --> 00:42:03,000

The tree's frozen solid, but it's still not smashing to smithereens.

578

00:42:03,000 --> 00:42:08,000

All right, it's about as good as we get.

579

00:42:08,000 --> 00:42:10,000

What more can you do?

580

00:42:10,000 --> 00:42:15,000

Well, here's what you could have done much earlier. Asked an expert.

581

00:42:15,000 --> 00:42:18,000

As an arborist, what are we doing wrong? Why is the tree not exploding?

582

00:42:18,000 --> 00:42:22,000

Trees and colder climates are naturally built to not explode.

583

00:42:22,000 --> 00:42:28,000

What happens is the water inside of the tree's cells moves to air spaces outside of the tree's cells,

584

00:42:28,000 --> 00:42:34,000

and those air spaces provide enough room for the water to expand without exploding the tree.

585

00:42:34,000 --> 00:42:40,000

So the water does freeze and it does expand, but because the air space is, the trunk doesn't go boom boom.

586

00:42:40,000 --> 00:42:41,000

Correct.

587

00:42:41,000 --> 00:42:44,000

So no matter how much we freeze this tree, it's never going to explode?

588

00:42:44,000 --> 00:42:45,000

I doubt it.

589

00:42:45,000 --> 00:42:47,000

Stupid adapting nature.

590

00:42:47,000 --> 00:42:50,000

All that remains is to officially admit defeat.

591

00:42:50,000 --> 00:42:56,000

Look at that. It's obvious that this tree is frozen completely to the core, and even with a high velocity impact,

592

00:42:56,000 --> 00:42:59,000

it did not shatter it or do anything that looked like an explosion.

593

00:42:59,000 --> 00:43:05,000

Yeah, we froze it with liquid nitrogen, didn't explode, and we hit it with a shotgun shell, still didn't explode.

594

00:43:05,000 --> 00:43:07,000

All right, guess we're calling this one busted.

595

00:43:07,000 --> 00:43:08,000

Busted.

596

00:43:08,000 --> 00:43:09,000

Busted.

597

00:43:09,000 --> 00:43:11,000

You know, I could always go into the tree tree business.

598

00:43:11,000 --> 00:43:12,000

Ha ha ha.

599

00:43:26,000 --> 00:43:28,000

Who's a good boy?