1

00:00:00,000 --> 00:00:04,600

Do not try any of the experiments you are about to see at home.

2

00:00:04,600 --> 00:00:06,800

You heard him. Don't do it.

3

00:00:09,800 --> 00:00:12,200

On this shocking episode of Mythbusters,

4

00:00:12,200 --> 00:00:17,800

there's the most explosively epic high speeds in Mythbusters history.

5

00:00:17,800 --> 00:00:18,800

Wow!

6

00:00:18,800 --> 00:00:23,200

As Adam and Jamie dig the dirt on a myth from World War I.

7

00:00:23,200 --> 00:00:25,800

When we say we're going to be digging holes,

8

00:00:25,800 --> 00:00:28,600

actually this thing's going to be digging holes.

9

00:00:28,800 --> 00:00:31,200

Can the shape of a battlefield trench

10

00:00:31,200 --> 00:00:32,400

What did you do today?

11

00:00:32,400 --> 00:00:34,000

I spray painted some dirt.

12

00:00:34,000 --> 00:00:37,600

really stop a shockwave and save a soldier's life?

13

00:00:37,600 --> 00:00:38,600

No.

14

00:00:38,600 --> 00:00:40,000

This is for real.

15

00:00:40,000 --> 00:00:42,200

Three, two, one. Bye-bye!

16

00:00:44,200 --> 00:00:46,000

I think there's going to be a crater there.

17

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

Meanwhile, Carrie Grant and Tori are clowning around.

18

00:00:50,000 --> 00:00:52,800

I just feel silly. I don't know why.

19

00:00:52,800 --> 00:00:57,000

In a comedy car crash, can a barrage of balloons

20

00:00:57,000 --> 00:01:00,000

Tori, it's fun time.

21

00:01:00,000 --> 00:01:03,200

Really aspire to be an alternative airbag?

22

00:01:03,200 --> 00:01:05,400

Or will this myth go pop?

23

00:01:05,400 --> 00:01:08,400

Here we go. In three, two, one.

24

00:01:12,600 --> 00:01:14,400

Who are the Mythbusters?

25

00:01:15,400 --> 00:01:16,600

Adam Savage

26

00:01:16,600 --> 00:01:18,800

Rod Davy, I'm ready for testing.

27

00:01:18,800 --> 00:01:20,400

and Jamie Heineman

28

00:01:20,400 --> 00:01:21,400

What can go wrong?

29

00:01:22,400 --> 00:01:26,600

Between them more than 30 years of special effects experience,

30

00:01:26,600 --> 00:01:28,600

together with Carrie Byron.

31

00:01:28,600 --> 00:01:30,000

That is a headache.

32

00:01:30,000 --> 00:01:31,200

Grant Imahara

33

00:01:31,200 --> 00:01:32,400

Somebody order an explosion.

34

00:01:32,400 --> 00:01:33,600

and Tori Bellatio

35

00:01:33,600 --> 00:01:35,600

Let's drop this car up!

36

00:01:35,600 --> 00:01:38,600

They don't just tell the myths,

37

00:01:38,600 --> 00:01:40,600

they put them to the test.

38

00:01:40,600 --> 00:01:42,600

The Mythbusters

39

00:01:42,600 --> 00:01:44,600

The Mythbusters

40

00:01:44,600 --> 00:01:46,600

The Mythbusters

41

00:01:46,600 --> 00:01:48,600

The Mythbusters

42

00:01:48,600 --> 00:01:50,600

The Mythbusters

43

00:01:50,600 --> 00:01:52,600

The Mythbusters

44

00:01:52,600 --> 00:01:54,600

The Mythbusters

45

00:01:54,600 --> 00:01:56,600

The Mythbusters

46

00:01:56,600 --> 00:01:58,600

Aren't you going to ask me about my costume?

47

00:01:58,600 --> 00:01:59,600

Nope.

48

00:01:59,600 --> 00:02:01,600

I'm going to tell you the story anyway.

49

00:02:01,600 --> 00:02:04,600

It comes from the fansite and obviously it's from World War One.

50

00:02:04,600 --> 00:02:08,600

Are you going to make some kind of joke about me being a boy in World War One?

51

00:02:08,600 --> 00:02:10,600

No, I promise I won't.

52

00:02:10,600 --> 00:02:16,600

The myth is that in World War One, Germans were very precise about the digging of their trenches.

53

00:02:16,600 --> 00:02:17,600

Towards what end?

54

00:02:17,600 --> 00:02:20,600

They thought that when a mortar landed in the trench,

55

00:02:20,600 --> 00:02:25,600

the 90 degree corners would prevent the blast pressure wave from traveling too far in the trench.

56

00:02:25,600 --> 00:02:28,600

They really were specific about it being sharp corners.

57

00:02:28,600 --> 00:02:33,600

They didn't want rounded corners that were worn away by people walking through sharp, sharp corners.

58

00:02:33,600 --> 00:02:34,600

That's the story.

59

00:02:34,600 --> 00:02:36,600

Alright, Earth moving equipment and explosives.

60

00:02:36,600 --> 00:02:38,600

Sounds like a perfect day.

61

00:02:40,600 --> 00:02:44,600

World War One's trench warfare was wretched.

62

00:02:44,600 --> 00:02:49,600

But could a carefully constructed corner really have an impact on soldier survival?

63

00:02:52,600 --> 00:02:55,600

It's a myth that shakes down to shock waves.

64

00:02:55,600 --> 00:02:59,600

A clumsy corner will supposedly let a shock wave sail right past,

65

00:02:59,600 --> 00:03:02,600

while a perfect pitch will stop it dead.

66

00:03:02,600 --> 00:03:05,600

But will this myth hit the wall?

67

00:03:07,600 --> 00:03:08,600

What's the plan?

68

00:03:08,600 --> 00:03:12,600

I'm thinking absolutely this is a story that we want to start in small scale.

69

00:03:12,600 --> 00:03:15,600

I'm thinking specifically using water ripples as our waves

70

00:03:15,600 --> 00:03:21,600

and watching them move through environments that match the shape of the trenches that we're thinking about.

71

00:03:21,600 --> 00:03:22,600

That makes sense.

72

00:03:22,600 --> 00:03:25,600

And I tell you what, why don't we make it like one of those wave machines?

73

00:03:25,600 --> 00:03:29,600

You know, the desktop toy that has oil over tinted water.

74

00:03:29,600 --> 00:03:30,600

Fantastic.

75

00:03:30,600 --> 00:03:33,600

That will slow down the reaction and hopefully we can see what's going on.

76

00:03:33,600 --> 00:03:34,600

Exactly.

77

00:03:34,600 --> 00:03:38,600

So, supersonic shock waves will let rip later,

78

00:03:38,600 --> 00:03:42,600

as the guys first dive into this myth with water.

79

00:03:43,600 --> 00:03:46,600

This whole story is about how different shaped trenches

80

00:03:46,600 --> 00:03:50,600

affect the propagation of blast pressures through those trenches.

81

00:03:50,600 --> 00:03:54,600

And we want to investigate some of these shapes here in the shop before going full scale.

82

00:03:54,600 --> 00:03:57,600

We've decided to build our trenches out of clear acrylic

83

00:03:57,600 --> 00:04:02,600

and we're going to fill them full of oil and water to watch the wave propagation.

84

00:04:02,600 --> 00:04:03,600

Isn't that cool?

85

00:04:03,600 --> 00:04:06,600

We're going to build one long straight one.

86

00:04:06,600 --> 00:04:08,600

It's not pretty but it'll do.

87

00:04:08,600 --> 00:04:11,600

We're going to build one that's kind of like a step.

88

00:04:11,600 --> 00:04:12,600

Freaking sexy man.

89

00:04:12,600 --> 00:04:15,600

And then we're going to build one loosey-goosey one

90

00:04:15,600 --> 00:04:20,600

to see what effect the round edges have that's different than the sharp edges.

91

00:04:20,600 --> 00:04:22,600

That's how you're meant to be.

92

00:04:22,600 --> 00:04:23,600

Yes.

93

00:04:23,600 --> 00:04:25,600

It's all falling into place.

94

00:04:25,600 --> 00:04:29,600

With the three tiny trenches bonded together, the filling can commence.

95

00:04:29,600 --> 00:04:31,600

First with water.

96

00:04:32,600 --> 00:04:34,600

And then with baby oil.

97

00:04:35,600 --> 00:04:38,600

This is all the baby oil San Francisco had today.

98

00:04:38,600 --> 00:04:41,600

Somewhere in the world there's a lot of rough babies.

99

00:04:41,600 --> 00:04:45,600

The tricky trio of oil, water and food dye,

100

00:04:45,600 --> 00:04:46,600

that looks cool doesn't it,

101

00:04:46,600 --> 00:04:51,600

should ensure that any wave propagation pattern is crystal clear.

102

00:04:53,600 --> 00:04:56,600

I like it when my waves smell like babies.

103

00:04:56,600 --> 00:05:01,600

But what's also clear is that an explosion in air, it ain't.

104

00:05:01,600 --> 00:05:05,600

Now before you get all up in arms of the fact that this myth is about blast pressure waves

105

00:05:05,600 --> 00:05:09,600

and we're doing a bunch of scale experiments with plex boxes and oil and water,

106

00:05:09,600 --> 00:05:16,600

please remember that an ocean wave, a sound wave, and a blast pressure wave

107

00:05:16,600 --> 00:05:19,600

are all effectively, mechanically the same thing.

108

00:05:19,600 --> 00:05:21,600

They are a moving wave.

109

00:05:21,600 --> 00:05:27,600

And since this whole story is about the idea that the shape of a trench can affect a wave,

110

00:05:27,600 --> 00:05:33,600

we consider these scale tests to be totally valid and analogous to what we expect to see when we go full scale.

111

00:05:33,600 --> 00:05:38,600

The final ingredient for this accurate analogy is to create a consistent crest.

112

00:05:38,600 --> 00:05:43,600

Now I've got to figure out a way to do this mechanically, but I think I've got an idea.

113

00:05:44,600 --> 00:05:48,600

So Adam hits the workshop once more and this time gets hammered.

114

00:05:49,600 --> 00:05:56,600

And before you could say, surf's up, he's got waves of smooth as silk, meaning the experiment can begin.

115

00:05:56,600 --> 00:06:01,600

So this is our impulse wave. It is our stand in for a shock wave.

116

00:06:01,600 --> 00:06:07,600

The motor is giving an exactly perfect pulse and delivering a wave that carries all the way to the end of our tank

117

00:06:07,600 --> 00:06:10,600

with a measurable amplitude, that is a height.

118

00:06:10,600 --> 00:06:17,600

Now what we're going to do is put this rig at the same exact orientation in each of our tank trenches

119

00:06:17,600 --> 00:06:22,600

and see what effect their shape has on the amplitude of the wave at the end.

120

00:06:22,600 --> 00:06:24,600

So are we ready to mark it down?

121

00:06:24,600 --> 00:06:26,600

Yeah, let's get our control done.

122

00:06:26,600 --> 00:06:27,600

Lights!

123

00:06:28,600 --> 00:06:29,600

Isn't that cool?

124

00:06:29,600 --> 00:06:30,600

Here we go.

125

00:06:30,600 --> 00:06:39,600

On cue, the machine ripples into action before Adam marks the waves high and low points at the far end of the straight trench.

126

00:06:40,600 --> 00:06:42,600

Our control was successful.

127

00:06:42,600 --> 00:06:48,600

Our wave impulse machine gave us a wave height from top to bottom at the end of the tank of three quarters of an inch.

128

00:06:48,600 --> 00:06:53,600

Now we want to find out if we get the same results when we run this same test through a right angle bend.

129

00:06:53,600 --> 00:06:57,600

Oil and water wave test in a right angle tank. Three, two, one.

130

00:07:01,600 --> 00:07:06,600

Oh, it looks like a pretty clear result just right off the top of my head.

131

00:07:06,600 --> 00:07:09,600

It's a lot larger on this end than it is on this one.

132

00:07:09,600 --> 00:07:11,600

Yeah, that is cool.

133

00:07:11,600 --> 00:07:15,600

Our right angle tank seems to be quite effective at reducing wave amplitude.

134

00:07:15,600 --> 00:07:21,600

After the first corner, it was reduced by two-thirds, and after the second corner, it was reduced by three-quarters.

135

00:07:21,600 --> 00:07:23,600

That's significant.

136

00:07:23,600 --> 00:07:28,600

Yep, by the time the wave reaches the end of this tank, its size has been severely slashed,

137

00:07:28,600 --> 00:07:32,600

meaning that the shark corners did shield their shock wave stand-in.

138

00:07:32,600 --> 00:07:34,600

Soft corners. Here we come.

139

00:07:34,600 --> 00:07:38,600

So how will their curved corner compare?

140

00:07:42,600 --> 00:07:44,600

It looks a little bigger down here.

141

00:07:44,600 --> 00:07:46,600

It does look a little bigger down there.

142

00:07:46,600 --> 00:07:48,600

It might have something.

143

00:07:48,600 --> 00:07:50,600

And on closer inspection, they do.

144

00:07:50,600 --> 00:07:56,600

This test's wave height is a quarter of an inch, lower than the control, but higher than the shark turn tank.

145

00:07:56,600 --> 00:07:59,600

So what does that mean for the myth?

146

00:07:59,600 --> 00:08:04,600

So the myth is that in World War I, Germans built their trenches on precise 90-degree angles

147

00:08:04,600 --> 00:08:09,600

on the assumption that it would limit the strength of shock waves traveling through the trenches.

148

00:08:11,600 --> 00:08:16,600

Our scale testing here in the shop with our small-scale trenches in all the shapes that we've tried

149

00:08:16,600 --> 00:08:19,600

seems to suggest that they might have been right.

150

00:08:19,600 --> 00:08:22,600

This is one of my favorite scale experiments we've ever done.

151

00:08:22,600 --> 00:08:23,600

What do you think?

152

00:08:23,600 --> 00:08:28,600

Well, this story's about blast pressure. We need explosives.

153

00:08:28,600 --> 00:08:32,600

Absolutely. That is definitely the next step, digging some trenches and blowing some stuff up.

154

00:08:32,600 --> 00:08:34,600

I'm gonna get a costume on.

155

00:08:34,600 --> 00:08:35,600

Okay.

156

00:08:36,600 --> 00:08:41,600

Next up, it's time to call in the clowns.

157

00:08:41,600 --> 00:08:44,600

All right, I've got a crazy myth for you.

158

00:08:44,600 --> 00:08:47,600

It involves clowns and car crashes.

159

00:08:47,600 --> 00:08:49,600

Two clowns are driving to a party.

160

00:08:49,600 --> 00:08:51,600

The clown on the passenger side has a big bunch of balloons.

161

00:08:51,600 --> 00:08:53,600

What happens? They go out of control and crash the car?

162

00:08:53,600 --> 00:08:58,600

Exactly. Now, the driver clown is wearing a seatbelt, so when they careen into a wall, he's fine.

163

00:08:58,600 --> 00:09:00,600

But the passenger is not.

164

00:09:00,600 --> 00:09:01,600

And the balloons save him?

165

00:09:01,600 --> 00:09:02,600

Exactly.

166

00:09:03,600 --> 00:09:06,600

It's a myth that makes for one heck of a headline.

167

00:09:06,600 --> 00:09:11,600

But can a bunch of party balloons really act as an improvised airbag?

168

00:09:11,600 --> 00:09:14,600

Or will this road speed wipeout go pot?

169

00:09:14,600 --> 00:09:17,600

All right, this is what we should do. We should crash two cars.

170

00:09:17,600 --> 00:09:20,600

We'll have them traveling at road speeds of around 35 miles an hour.

171

00:09:20,600 --> 00:09:24,600

And with the first car, we'll see what happens to an unseatbelted passenger.

172

00:09:24,600 --> 00:09:27,600

Great. And for the second one, we can put an average bunch of balloons in the passenger seat

173

00:09:27,600 --> 00:09:29,600

and see what that does to the G-loads.

174

00:09:29,600 --> 00:09:31,600

Okay, let's start clowning around.

175

00:09:33,600 --> 00:09:37,600

So we are testing the myth that a bunch of balloons will save a clown's life in a car crash.

176

00:09:37,600 --> 00:09:40,600

And we are going to be crashing a bunch of vehicles.

177

00:09:40,600 --> 00:09:45,600

But before we stick a clown in balloons in there, we need to transform that into a clown car.

178

00:09:45,600 --> 00:09:47,600

Let's go to work.

179

00:09:49,600 --> 00:09:54,600

According to police reports, the clowns were driving a run-of-the-mill run-around like this.

180

00:09:54,600 --> 00:09:57,600

I just feel silly. I don't know why.

181

00:09:57,600 --> 00:10:01,600

Albeit one that had been pimped for a party.

182

00:10:01,600 --> 00:10:03,600

Yeah, the blue circle.

183

00:10:03,600 --> 00:10:09,600

And after Tori finishes his stripes and stars, this car is ready to take the plunge.

184

00:10:09,600 --> 00:10:12,600

So the clown car is done. Now it's time for the fun part.

185

00:10:12,600 --> 00:10:15,600

We're going to take it up with the crane and drop it straight on its nose,

186

00:10:15,600 --> 00:10:18,600

as if it's crashing into a wall at 35 miles an hour.

187

00:10:18,600 --> 00:10:21,600

And find out what kind of forces we're going to get.

188

00:10:21,600 --> 00:10:27,600

The vertical drop is a curious way to crash cars.

189

00:10:28,600 --> 00:10:35,600

But with no chance of a rogue runaway or a flat-on fence,

190

00:10:35,600 --> 00:10:39,600

it's the most reliable rig for a party balloon pilot.

191

00:10:41,600 --> 00:10:46,600

So first up, we are going to do a control test with the driver belted in and the passenger not belted in.

192

00:10:46,600 --> 00:10:48,600

And see what kind of G-loads we get.

193

00:10:48,600 --> 00:10:50,600

Now remember, there won't be any balloons in that test.

194

00:10:50,600 --> 00:10:53,600

In the second test, we're going to do the exact same thing.

195

00:10:53,600 --> 00:10:57,600

This time, put a bunch of balloons in front of the passenger and see what difference that makes.

196

00:10:57,600 --> 00:11:01,600

And to do just that, the guys first need a couple of clowns.

197

00:11:01,600 --> 00:11:04,600

Who? One stressed to kill.

198

00:11:04,600 --> 00:11:06,600

Making him smile.

199

00:11:06,600 --> 00:11:12,600

Are put into their respective hot seats where, just like the myth, the driver is buckled up,

200

00:11:12,600 --> 00:11:14,600

but his passenger is not.

201

00:11:14,600 --> 00:11:17,600

What kind of clown would wear seatbelt?

202

00:11:17,600 --> 00:11:20,600

The final piece of the puzzle is to add the data sensors.

203

00:11:20,600 --> 00:11:23,600

And that means it's time to get scientific.

204

00:11:23,600 --> 00:11:25,600

What I have here is an accelerometer.

205

00:11:25,600 --> 00:11:28,600

Now we'll have two of them. One will be attached to the clown's head and to the chest.

206

00:11:28,600 --> 00:11:31,600

Now when the crash happens, voltage will be sent to the data logger.

207

00:11:31,600 --> 00:11:33,600

And that way we'll be able to record the event.

208

00:11:33,600 --> 00:11:37,600

Then we'll look at the data later and find out how many G's the clown endured.

209

00:11:37,600 --> 00:11:42,600

A survivable G-load is anything under 100 G's. That's our benchmark.

210

00:11:42,600 --> 00:11:48,600

Now to measure that, we have our PCB accelerometers and the help of our friend David from National Instruments.

211

00:11:48,600 --> 00:11:52,600

And with that, everything's set for lift off.

212

00:11:52,600 --> 00:11:54,600

Send in the clowns.

213

00:11:54,600 --> 00:11:58,600

We've got all of our sensors in place. Now it's time to raise the car.

214

00:11:58,600 --> 00:12:01,600

Yeah, we good. We got a big one.

215

00:12:01,600 --> 00:12:06,600

Now we've calculated that if we raise the car 41 feet from the bumper to the ground,

216

00:12:06,600 --> 00:12:08,600

we can achieve a 35 mile per hour crash.

217

00:12:08,600 --> 00:12:12,600

Alright, this is clown car control test.

218

00:12:12,600 --> 00:12:14,600

In three, two, one.

219

00:12:19,600 --> 00:12:25,600

In Trench Torpedo, Adam and Jamie's small scale test.

220

00:12:25,600 --> 00:12:27,600

It looks a little bigger down here.

221

00:12:27,600 --> 00:12:31,600

Has shown that a sharp corner can stop a watery wave.

222

00:12:31,600 --> 00:12:33,600

This is really, really cool.

223

00:12:33,600 --> 00:12:36,600

But how about an explosive one?

224

00:12:36,600 --> 00:12:39,600

Well that seemed to work pretty well. Maybe there is something to the technique.

225

00:12:39,600 --> 00:12:43,600

Yep, I think it's time to build some real trenches and use some real explosives.

226

00:12:43,600 --> 00:12:45,600

Let's get digging.

227

00:12:45,600 --> 00:12:50,600

So to dig the dirt on this myth full scale, the guys march to a memorable location.

228

00:12:50,600 --> 00:12:56,600

We're in Ion, California today and I'm standing on the exact spot where we actually tested the drain disaster myth of all things.

229

00:13:00,600 --> 00:13:05,600

Today, however, we're going to go back in time and dig a bunch of World War I trenches

230

00:13:05,600 --> 00:13:07,600

and subject them to some enemy fire.

231

00:13:07,600 --> 00:13:10,600

It's going to bring back a lot of memories for Jamie.

232

00:13:10,600 --> 00:13:14,600

Like in their shop tests, the guys are going to throw together three trenches.

233

00:13:14,600 --> 00:13:16,600

Trench number one.

234

00:13:16,600 --> 00:13:18,600

The straight away.

235

00:13:18,600 --> 00:13:21,600

The rigid right angle and the shoddy serpentine.

236

00:13:21,600 --> 00:13:23,600

That looks cool.

237

00:13:23,600 --> 00:13:26,600

And once they're all marked up, the digging can go down.

238

00:13:29,600 --> 00:13:32,600

Where, thanks to some heavy machinery

239

00:13:34,600 --> 00:13:37,600

and a time to get a little bit of a better look,

240

00:13:38,600 --> 00:13:41,600

and a time lapse montage,

241

00:13:41,600 --> 00:13:45,600

their 350 footers get sunk fast.

242

00:13:45,600 --> 00:13:48,600

But that doesn't mean it's job done.

243

00:13:48,600 --> 00:13:51,600

Not many people know this, but Jamie's family are color farmers.

244

00:13:51,600 --> 00:13:57,600

They've been farming color like this on specially treated pieces of plywood out in the fields for years.

245

00:13:57,600 --> 00:14:00,600

This is totally not true, not even a little bit.

246

00:14:00,600 --> 00:14:05,600

In fact, we are color coding our trenches so that both from a sequence and narrative standpoint,

247

00:14:05,600 --> 00:14:08,600

you can clearly see which trench we're doing at a given time,

248

00:14:08,600 --> 00:14:11,600

but also experimentally to help you separate them in your mind.

249

00:14:13,600 --> 00:14:16,600

The color coding does help Taylor make each tunnel.

250

00:14:16,600 --> 00:14:18,600

Coming along nicely.

251

00:14:18,600 --> 00:14:21,600

But the boards are also there to shore up the sides.

252

00:14:21,600 --> 00:14:23,600

Why are we showing up the sides?

253

00:14:23,600 --> 00:14:27,600

Well, really specifically, it's so that we get perfectly straight edges

254

00:14:27,600 --> 00:14:31,600

and precise corners for our blast wave to move through.

255

00:14:31,600 --> 00:14:34,600

That's how we're going to assess the soul of this story.

256

00:14:34,600 --> 00:14:40,600

Of course, there's one part of one trench where strictly straight sides are not the order of the day.

257

00:14:40,600 --> 00:14:42,600

This one, the imprecise corner trench,

258

00:14:42,600 --> 00:14:48,600

we are leaving uncovered with the wood on the curvy parts to get the biggest difference that we possibly can.

259

00:14:48,600 --> 00:14:52,600

Also for visual symmetry, we're going to paint it blue to match the walls.

260

00:14:52,600 --> 00:14:53,600

Here we go.

261

00:14:54,600 --> 00:14:55,600

Wow!

262

00:14:55,600 --> 00:14:56,600

Woohoo!

263

00:14:56,600 --> 00:14:57,600

Yeah!

264

00:14:57,600 --> 00:15:00,600

Adams tickle pink by the blue.

265

00:15:00,600 --> 00:15:04,600

But what's more important is that with that, it's time to bring on the boom.

266

00:15:06,600 --> 00:15:10,600

Our trenches are dug, they're shored up, heck, they're even color coded.

267

00:15:10,600 --> 00:15:12,600

Now it's time for the explosives.

268

00:15:12,600 --> 00:15:17,600

Our benchmark control test will be this trench, the 50 foot long straight.

269

00:15:17,600 --> 00:15:20,600

It should give us a fantastic idea of what happens to a blast wave

270

00:15:20,600 --> 00:15:23,600

as it travels through exactly this configuration.

271

00:15:24,600 --> 00:15:28,600

And when we've got that data, we're going to do the same test in this one,

272

00:15:28,600 --> 00:15:32,600

which is the classic German sharp edged right angle trench.

273

00:15:32,600 --> 00:15:34,600

And we'll compare the two.

274

00:15:36,600 --> 00:15:42,600

And finally, we'll be sending an explosive blast wave through our soft cornered serpentine trench.

275

00:15:42,600 --> 00:15:44,600

And if there's anything to this story whatsoever,

276

00:15:44,600 --> 00:15:49,600

what we expect to see is a higher blast pressure where I'm standing

277

00:15:49,600 --> 00:15:53,600

than in the corresponding spot in our hard cornered trench.

278

00:15:53,600 --> 00:15:56,600

Alright, let's rig all the explosions!

279

00:16:00,600 --> 00:16:03,600

It's enough to make a clown frown.

280

00:16:03,600 --> 00:16:08,600

But can party balloons really save your life in a 35 mile an hour fender bender?

281

00:16:10,600 --> 00:16:15,600

To find out, the Mythbusters control car is about to crash land.

282

00:16:15,600 --> 00:16:18,600

Alright, we're ready to drop the clown car.

283

00:16:18,600 --> 00:16:21,600

In three, two, one.

284

00:16:27,600 --> 00:16:29,600

I don't think those clowns survived.

285

00:16:29,600 --> 00:16:34,600

To the naked eye, the 35 mile an hour head on looks horrific.

286

00:16:35,600 --> 00:16:38,600

But survival is all about the G-Lo,

287

00:16:38,600 --> 00:16:42,600

where anything over a hundred means there's been a clown catastrophe.

288

00:16:42,600 --> 00:16:47,600

Now the driver with seatbelt experienced 150 G's.

289

00:16:47,600 --> 00:16:49,600

That's well over our benchmark for fatality.

290

00:16:49,600 --> 00:16:53,600

But even more interesting, the passenger that didn't have a seatbelt on

291

00:16:53,600 --> 00:16:57,600

or an airbag experienced 630 on the chest and 340 on the head.

292

00:16:57,600 --> 00:16:59,600

That is devastating.

293

00:16:59,600 --> 00:17:03,600

It's going to be really interesting to see if the balloons will have any impact on the numbers.

294

00:17:03,600 --> 00:17:06,600

So, cue clown car two.

295

00:17:06,600 --> 00:17:08,600

Another day, another clown car.

296

00:17:08,600 --> 00:17:13,600

Like the control test, the driver clown is buckled up while the passenger isn't.

297

00:17:13,600 --> 00:17:15,600

I think this wig absorbed any of the energy.

298

00:17:15,600 --> 00:17:18,600

But unlike the control test...

299

00:17:18,600 --> 00:17:21,600

Toray, it's fun time.

300

00:17:22,600 --> 00:17:26,600

Drop two will have the mythical balloon barrier.

301

00:17:26,600 --> 00:17:29,600

Alright, now it's time to put the balloons in the car.

302

00:17:29,600 --> 00:17:33,600

Now the theory here is these balloons are going to act as an airbag.

303

00:17:33,600 --> 00:17:36,600

Now the goal of any airbag is to slow the balloon down.

304

00:17:36,600 --> 00:17:40,600

Now the goal of any airbag is to slow the passengers forward motion.

305

00:17:40,600 --> 00:17:44,600

It's evenly as possible in just a fraction of a second.

306

00:17:44,600 --> 00:17:46,600

I'm not sure these balloons are going to function that way,

307

00:17:46,600 --> 00:17:49,600

but it's sure going to be fun to find out.

308

00:17:51,600 --> 00:17:54,600

Alright, this is the clown car drop with balloons. Are you ready?

309

00:17:54,600 --> 00:17:57,600

Okay, in three, two, one.

310

00:17:57,600 --> 00:17:59,600

Take it in one.

311

00:18:06,600 --> 00:18:08,600

Now that is what I call a party.

312

00:18:08,600 --> 00:18:10,600

I don't think they survived it though.

313

00:18:10,600 --> 00:18:13,600

Once again, the crash was a smash.

314

00:18:13,600 --> 00:18:19,600

As the passenger pushed past the balloon barrier and wiped out on the windshield.

315

00:18:20,600 --> 00:18:23,600

Alright Dave, big question on everyone's minds.

316

00:18:23,600 --> 00:18:25,600

Did the balloon save the clown's life?

317

00:18:25,600 --> 00:18:30,600

Though in the first drop with no balloons, the passengers saw 340 Gs at the head,

318

00:18:30,600 --> 00:18:32,600

630 Gs at the chest.

319

00:18:32,600 --> 00:18:36,600

In the drop with the balloons, the passengers saw 350 Gs to the head,

320

00:18:36,600 --> 00:18:38,600

and 620 at the chest.

321

00:18:38,600 --> 00:18:41,600

So the results are pretty much the same. The balloons didn't do anything for him.

322

00:18:41,600 --> 00:18:44,600

Almost no difference at all. Thanks for your help.

323

00:18:44,600 --> 00:18:46,600

Well, I'll show you my balloon animals.

324

00:18:48,600 --> 00:18:52,600

So it turns out an average bunch of party balloons is not enough to save your life in a car crash.

325

00:18:52,600 --> 00:18:55,600

But it's not such an outlandish idea.

326

00:18:55,600 --> 00:18:58,600

An airbag is an inflatable and so is a balloon.

327

00:18:58,600 --> 00:19:02,600

Maybe there's a balloon out there or a configuration of balloons that we could make

328

00:19:02,600 --> 00:19:04,600

that would save your life in a car wreck.

329

00:19:04,600 --> 00:19:10,600

In other words, the myth may be down, but burst in a.

330

00:19:10,600 --> 00:19:18,600

Coming right up in Trench Torpedo, the high speed shots that put the awe in awesome.

331

00:19:18,600 --> 00:19:20,600

Wow.

332

00:19:21,600 --> 00:19:27,600

Welcome back.

333

00:19:27,600 --> 00:19:32,600

All episode long, we've been testing it from World War I that a sharp cornered trench

334

00:19:32,600 --> 00:19:35,600

is better in warfare than a soft rounded cornered trench

335

00:19:35,600 --> 00:19:41,600

because it inhibits blast waves from traveling through the trenches sent by exploding mortar shells.

336

00:19:41,600 --> 00:19:44,600

We are now at the full-scale phase of this test,

337

00:19:44,600 --> 00:19:48,600

and we have a bunch of beautiful trenches out here in Gold Country in Northern California.

338

00:19:48,600 --> 00:19:50,600

We have some explosives in our arsenal.

339

00:19:50,600 --> 00:19:51,600

Nice.

340

00:19:51,600 --> 00:19:53,600

Yet another use for duct tape.

341

00:19:53,600 --> 00:19:57,600

And any minute now, we're going to start blowing some stuff up for science.

342

00:19:57,600 --> 00:20:03,600

Indeed, but for test one, there will be a torpedo, but there won't be a trench.

343

00:20:03,600 --> 00:20:08,600

Right here in this very spot, shortly we'll be setting off 25 pounds of TNT

344

00:20:08,600 --> 00:20:11,600

as our open air, unobstructed control test.

345

00:20:11,600 --> 00:20:14,600

We've got sensors placed at 10 foot increments

346

00:20:14,600 --> 00:20:19,600

because shortly after that, we'll be setting off explosions in the trenches

347

00:20:19,600 --> 00:20:22,600

and collecting and comparing similar data.

348

00:20:22,600 --> 00:20:27,600

In other words, the open air blast should give the guys a bonus benchmark.

349

00:20:34,600 --> 00:20:35,600

Are you ready?

350

00:20:35,600 --> 00:20:36,600

Are you the keymaster?

351

00:20:36,600 --> 00:20:38,600

I am the keymaster.

352

00:20:38,600 --> 00:20:39,600

Are you Gozer?

353

00:20:39,600 --> 00:20:40,600

I'm Gozer, baby.

354

00:20:40,600 --> 00:20:41,600

All right, here we go.

355

00:20:41,600 --> 00:20:43,600

Above ground blast.

356

00:20:43,600 --> 00:20:46,600

And three, two, one.

357

00:20:52,600 --> 00:20:53,600

I can feel that.

358

00:20:53,600 --> 00:20:58,600

That was like a refreshing breeze that lasted a very short period of time.

359

00:20:58,600 --> 00:21:01,600

It sure was a refreshing flera.

360

00:21:01,600 --> 00:21:04,600

And the good news is that the high speeds, the bomb.

361

00:21:04,600 --> 00:21:06,600

Look at that.

362

00:21:06,600 --> 00:21:10,600

Wow, that might be one of the prettiest ones we've ever gotten on camera.

363

00:21:10,600 --> 00:21:14,600

But the better news is they got the data.

364

00:21:14,600 --> 00:21:18,600

20 feet from the blast and pressure was 39 pounds per square inch.

365

00:21:18,600 --> 00:21:20,600

30 feet, it was 12.

366

00:21:20,600 --> 00:21:23,600

And by 50 feet, it had dropped to just five.

367

00:21:23,600 --> 00:21:24,600

Straight trench.

368

00:21:24,600 --> 00:21:29,600

But how will those numbers differ once the guys get down and dirty?

369

00:21:34,600 --> 00:21:36,600

The myth of the clown car crash.

370

00:21:36,600 --> 00:21:39,600

Now that is what I call a party.

371

00:21:39,600 --> 00:21:44,600

It is so far looking like balloon baloney, but all is not lost.

372

00:21:44,600 --> 00:21:45,600

All right, so that didn't work.

373

00:21:45,600 --> 00:21:47,600

The clown pushed right through the balloons.

374

00:21:47,600 --> 00:21:50,600

True, but there are other types of balloons than the ones that we tested.

375

00:21:50,600 --> 00:21:52,600

Well, it sounds like we should do some small scale tests.

376

00:21:52,600 --> 00:21:54,600

Maybe we should take a weight, drop it on different types of balloons,

377

00:21:54,600 --> 00:21:57,600

and see which balloon decelerates the way at the best.

378

00:21:57,600 --> 00:21:58,600

I like it.

379

00:21:58,600 --> 00:22:02,600

So far, we haven't had any success at all with using balloons as airbags.

380

00:22:02,600 --> 00:22:03,600

They just don't cut it.

381

00:22:03,600 --> 00:22:09,600

So what we need to do now is look at balloons and find out which one absorbs the most energy.

382

00:22:09,600 --> 00:22:12,600

To do that, I'm going to build a balloon crushing rig.

383

00:22:12,600 --> 00:22:17,600

And a rustle up said rig, Grant first wrestles up some giant metal rings.

384

00:22:17,600 --> 00:22:19,600

Hula hoop anyone?

385

00:22:21,600 --> 00:22:24,600

Which are then welded together into a tube.

386

00:22:24,600 --> 00:22:26,600

It's science.

387

00:22:26,600 --> 00:22:28,600

Before being plastered with plastic.

388

00:22:30,600 --> 00:22:31,600

Done.

389

00:22:31,600 --> 00:22:33,600

Then just two things remain.

390

00:22:33,600 --> 00:22:37,600

A wooden drop disc with a dead on diameter.

391

00:22:39,600 --> 00:22:43,600

And an explanation of how on earth it works.

392

00:22:43,600 --> 00:22:45,600

So the balloon basher is finally finished.

393

00:22:45,600 --> 00:22:49,600

I've got my polycarbonate cylinder with the steel reinforcing frame.

394

00:22:49,600 --> 00:22:53,600

I've added this plunger right here with a 50 pound weight.

395

00:22:53,600 --> 00:22:58,600

The idea is that we drop this onto each type of balloon using the same weight

396

00:22:58,600 --> 00:23:04,600

and the same volume of balloons each time we can compare and find out which type of balloon absorbs the most energy.

397

00:23:04,600 --> 00:23:07,600

With the rig at the ready, the testing can tumble.

398

00:23:07,600 --> 00:23:09,600

Starting with the control.

399

00:23:09,600 --> 00:23:12,600

Here we go. This is control test with no balloons.

400

00:23:12,600 --> 00:23:14,600

In three, two, one.

401

00:23:16,600 --> 00:23:17,600

Okay.

402

00:23:19,600 --> 00:23:22,600

Okay, control is 100 Gs.

403

00:23:25,600 --> 00:23:27,600

Next, it's time to bring on the balloons.

404

00:23:27,600 --> 00:23:28,600

Eight.

405

00:23:28,600 --> 00:23:31,600

Beginning with the type from their earlier test.

406

00:23:31,600 --> 00:23:34,600

15 air filled latex balloons.

407

00:23:34,600 --> 00:23:36,600

In three, two, one.

408

00:23:38,600 --> 00:23:43,600

Immediately it's clear that the regular latex balloons barely curtailed the crusher at all.

409

00:23:43,600 --> 00:23:47,600

As the accelerometer data almost matches the control.

410

00:23:47,600 --> 00:23:49,600

Now we're going to move on and see which is better.

411

00:23:49,600 --> 00:23:51,600

Different materials and different shapes.

412

00:23:51,600 --> 00:23:52,600

Like this.

413

00:23:53,600 --> 00:23:55,600

With no balloon left behind.

414

00:23:55,600 --> 00:23:57,600

Next up, it's...

415

00:23:57,600 --> 00:23:58,600

Balloon animal.

416

00:23:58,600 --> 00:24:01,600

To ensure a correct comparison.

417

00:24:01,600 --> 00:24:04,600

Look at that one. That's not a freaking nature at all.

418

00:24:04,600 --> 00:24:07,600

The guys fill the cylinder to precisely the same depth.

419

00:24:07,600 --> 00:24:09,600

I'm making a pterodactyl.

420

00:24:11,600 --> 00:24:13,600

But will their curious creations...

421

00:24:13,600 --> 00:24:14,600

Oh, that's a good one.

422

00:24:14,600 --> 00:24:16,600

Yeah, it's an octopus.

423

00:24:16,600 --> 00:24:18,600

Lower the G load at all.

424

00:24:18,600 --> 00:24:22,600

Balloon animals in three, two, one.

425

00:24:25,600 --> 00:24:27,600

That worked pretty good.

426

00:24:27,600 --> 00:24:29,600

That worked better than I thought it would.

427

00:24:30,600 --> 00:24:33,600

This is really cool. Look, it goes from 100 to 6.

428

00:24:33,600 --> 00:24:35,600

We got 6 G's from the balloon animals?

429

00:24:35,600 --> 00:24:36,600

Yeah.

430

00:24:36,600 --> 00:24:39,600

With a G load slashed so significantly.

431

00:24:39,600 --> 00:24:42,600

Balloon animals may yet be top dog.

432

00:24:42,600 --> 00:24:44,600

But next it's...

433

00:24:44,600 --> 00:24:45,600

Little balloons.

434

00:24:47,600 --> 00:24:50,600

Alright, small latex party balloons.

435

00:24:50,600 --> 00:24:51,600

They're so adorable.

436

00:24:51,600 --> 00:24:53,600

Three, two, one.

437

00:24:54,600 --> 00:24:58,600

They might be little, but man, they do a good job.

438

00:24:58,600 --> 00:24:59,600

Tolly's right.

439

00:24:59,600 --> 00:25:02,600

These miniature marvels did such a good job

440

00:25:02,600 --> 00:25:05,600

that they cut the G's to just 2.8.

441

00:25:05,600 --> 00:25:09,600

But can that be bettered with the next party pitch?

442

00:25:10,600 --> 00:25:11,600

Big balloon.

443

00:25:11,600 --> 00:25:13,600

The advantage of these bad boys

444

00:25:13,600 --> 00:25:15,600

is that they're made of a thicker latex,

445

00:25:15,600 --> 00:25:17,600

which could lower the load.

446

00:25:18,600 --> 00:25:19,600

What?

447

00:25:20,600 --> 00:25:21,600

Ow!

448

00:25:23,600 --> 00:25:25,600

Alright, giant party balloons.

449

00:25:25,600 --> 00:25:26,600

Here we go.

450

00:25:26,600 --> 00:25:28,600

In three, two, one.

451

00:25:30,600 --> 00:25:31,600

Come look at this one.

452

00:25:31,600 --> 00:25:32,600

Look at the oversized one.

453

00:25:32,600 --> 00:25:33,600

You got it.

454

00:25:33,600 --> 00:25:34,600

Two.

455

00:25:34,600 --> 00:25:36,600

I think we have winner.

456

00:25:36,600 --> 00:25:37,600

I know, isn't that crazy?

457

00:25:37,600 --> 00:25:38,600

That's awesome.

458

00:25:47,600 --> 00:25:49,600

Yeah, now it's a party.

459

00:25:52,600 --> 00:25:53,600

Ow.

460

00:25:56,600 --> 00:26:00,600

Please, don't try anything you're about to see at home.

461

00:26:00,600 --> 00:26:02,600

We're what you call experts.

462

00:26:06,600 --> 00:26:09,600

In three, two, one.

463

00:26:10,600 --> 00:26:15,600

Adam and Jamie's open air blast is beautifully done and dusted.

464

00:26:15,600 --> 00:26:18,600

Which means now it's time to dig deeper.

465

00:26:18,600 --> 00:26:19,600

We are tied in here.

466

00:26:20,600 --> 00:26:22,600

First up is the control trench.

467

00:26:22,600 --> 00:26:23,600

Here we are.

468

00:26:23,600 --> 00:26:27,600

50 feet of green straight away that's about to get rocked.

469

00:26:27,600 --> 00:26:32,600

Alright, straight trench in three, two, one.

470

00:26:35,600 --> 00:26:36,600

Wow.

471

00:26:40,600 --> 00:26:42,600

Things are falling.

472

00:26:42,600 --> 00:26:43,600

Yeah.

473

00:26:43,600 --> 00:26:45,600

Things are falling from the sky.

474

00:26:46,600 --> 00:26:48,600

That was spectacular.

475

00:26:52,600 --> 00:26:55,600

Spectacular and spine chilling.

476

00:26:55,600 --> 00:26:56,600

Oh man.

477

00:26:56,600 --> 00:27:00,600

Their straight and true trench has been well and truly trashed.

478

00:27:00,600 --> 00:27:02,600

Well, our first trench test was,

479

00:27:02,600 --> 00:27:06,600

I think the word I'm going to use is gangbusters.

480

00:27:07,600 --> 00:27:10,600

The level of destruction is really shockingly higher

481

00:27:10,600 --> 00:27:12,600

than I would have expected.

482

00:27:12,600 --> 00:27:18,600

The fireball itself reached almost 35 feet down this trench.

483

00:27:19,600 --> 00:27:21,600

It is, it's horrifying.

484

00:27:21,600 --> 00:27:23,600

It's just horrifying.

485

00:27:26,600 --> 00:27:30,600

Both the high jinx and the high speed suggest that the blast was harsh.

486

00:27:30,600 --> 00:27:33,600

But what do the PCB sensors say?

487

00:27:33,600 --> 00:27:37,600

Well, our pressure sensor data from the trench test is very, very interesting.

488

00:27:37,600 --> 00:27:38,600

Editors, will you help me out?

489

00:27:38,600 --> 00:27:40,600

Draw two lines.

490

00:27:40,600 --> 00:27:41,600

Fantastic.

491

00:27:41,600 --> 00:27:43,600

Label one trench and one above ground.

492

00:27:43,600 --> 00:27:45,600

Now put down the sensor data that we got.

493

00:27:46,600 --> 00:27:47,600

See that?

494

00:27:47,600 --> 00:27:48,600

See that?

495

00:27:48,600 --> 00:27:52,600

The trench seems to have an amplifying effect on the shockwave.

496

00:27:52,600 --> 00:27:55,600

It's significantly higher in the trench than above ground.

497

00:27:55,600 --> 00:27:58,600

Now, does the shape of the trench affect that amplification?

498

00:27:58,600 --> 00:28:00,600

Well, that's the question, isn't it?

499

00:28:04,600 --> 00:28:06,600

In party balloon pileup,

500

00:28:06,600 --> 00:28:09,600

the guys now know the best case balloon.

501

00:28:09,600 --> 00:28:11,600

I think we have winner.

502

00:28:11,600 --> 00:28:14,600

So cue more car crash carnage.

503

00:28:14,600 --> 00:28:16,600

We're going to run the test the exact same way.

504

00:28:16,600 --> 00:28:19,600

We have our two clowns, one in the passenger seat without a seat belt,

505

00:28:19,600 --> 00:28:21,600

one in the driver's seat with the seat belt.

506

00:28:21,600 --> 00:28:24,600

Both of them will have accelerometers attached to them.

507

00:28:24,600 --> 00:28:26,600

We're going to take the car up with the craze,

508

00:28:26,600 --> 00:28:29,600

drop it from 41 feet so it's traveling at 35 miles an hour,

509

00:28:29,600 --> 00:28:32,600

let it crash into the ground and see if the balloons make a difference.

510

00:28:33,600 --> 00:28:36,600

Remember, with regular ATX balloons,

511

00:28:36,600 --> 00:28:39,600

the clowns peaked at 620 Gs,

512

00:28:39,600 --> 00:28:42,600

six times over the lethal limit.

513

00:28:43,600 --> 00:28:47,600

But for this test, the guys aren't just opting for their optimal thick balloons.

514

00:28:47,600 --> 00:28:50,600

I love to pump some helium every now and again.

515

00:28:50,600 --> 00:28:54,600

They're also packing them in as tightly as possible.

516

00:28:54,600 --> 00:28:57,600

This is like how we used to pack for family trips.

517

00:28:57,600 --> 00:28:58,600

Take her up.

518

00:28:59,600 --> 00:29:02,600

So we're about to drop the clown with the balloons.

519

00:29:02,600 --> 00:29:05,600

Now remember, our benchmark is 100 Gs.

520

00:29:05,600 --> 00:29:08,600

We need to see the balloons decrease the G load below that.

521

00:29:08,600 --> 00:29:11,600

If he goes over 100 Gs, the clown is dead.

522

00:29:11,600 --> 00:29:13,600

And so is this myth.

523

00:29:14,600 --> 00:29:18,600

Alright, this is clown car drop with our best latex balloon.

524

00:29:18,600 --> 00:29:21,600

Here we go in 3, 2, 1.

525

00:29:29,600 --> 00:29:30,600

Oh my God!

526

00:29:30,600 --> 00:29:32,600

I think I might have worked, man!

527

00:29:32,600 --> 00:29:34,600

I think that clown may have survived!

528

00:29:35,600 --> 00:29:37,600

What a beautiful sight.

529

00:29:38,600 --> 00:29:42,600

I saw that clown car descending towards the earth,

530

00:29:42,600 --> 00:29:45,600

and then I saw the high speed.

531

00:29:46,600 --> 00:29:48,600

Now in the high speed,

532

00:29:48,600 --> 00:29:51,600

you actually see the car starts to compact.

533

00:29:51,600 --> 00:29:55,600

The balloons separate just enough for a clown face to peek through,

534

00:29:55,600 --> 00:29:58,600

and a clown knows to dust the windshield,

535

00:29:58,600 --> 00:30:01,600

and then start to go back into the car,

536

00:30:01,600 --> 00:30:04,600

as if the balloons are bouncing him back.

537

00:30:04,600 --> 00:30:06,600

Alright Byron, how'd we do?

538

00:30:06,600 --> 00:30:08,600

Did either guy get under 100 Gs?

539

00:30:08,600 --> 00:30:12,600

Now you'll remember he sustained over 600 Gs with just the party balloons.

540

00:30:12,600 --> 00:30:15,600

But this time, only 130.

541

00:30:15,600 --> 00:30:17,600

Wow, that is a huge reduction in the G load,

542

00:30:17,600 --> 00:30:19,600

but still 130 Gs to your body,

543

00:30:19,600 --> 00:30:21,600

there is no way you're going to survive that.

544

00:30:21,600 --> 00:30:23,600

Yeah, unfortunately, we're going to have to call this from busted.

545

00:30:23,600 --> 00:30:24,600

Totally busted.

546

00:30:24,600 --> 00:30:26,600

Thought for a second there, it had a glimmer of hope.

547

00:30:26,600 --> 00:30:28,600

Nope, still dead.

548

00:30:29,600 --> 00:30:32,600

So it turns out, even with our best balloon, the oversized latex balloon,

549

00:30:32,600 --> 00:30:34,600

we were not able to save the clown's life.

550

00:30:34,600 --> 00:30:36,600

So this myth is busted,

551

00:30:36,600 --> 00:30:37,600

but we're not going to stop there.

552

00:30:37,600 --> 00:30:39,600

This is myth busters, it's time to ramp it up.

553

00:30:39,600 --> 00:30:41,600

So we're going to go back to the shop,

554

00:30:41,600 --> 00:30:44,600

and see if we can come up with some kind of configuration of balloons

555

00:30:44,600 --> 00:30:46,600

that could save the clown's life.

556

00:30:46,600 --> 00:30:47,600

What?

557

00:30:47,600 --> 00:30:49,600

In their earlier shop tests,

558

00:30:49,600 --> 00:30:52,600

they might be little, but man, they do a good job.

559

00:30:52,600 --> 00:30:55,600

The guys tested one balloon type at a time,

560

00:30:55,600 --> 00:30:58,600

but now it's anything goes.

561

00:30:58,600 --> 00:30:59,600

Get to work.

562

00:30:59,600 --> 00:31:01,600

As the myth busters go head to head

563

00:31:01,600 --> 00:31:05,600

in a quest to find the ultimate life-saving balloon barrier.

564

00:31:05,600 --> 00:31:07,600

First up is Carrie.

565

00:31:09,600 --> 00:31:11,600

Too much. Too much.

566

00:31:11,600 --> 00:31:15,600

Who's making what can only be described as a wiener whoopee cushion.

567

00:31:19,600 --> 00:31:20,600

That might work.

568

00:31:20,600 --> 00:31:24,600

This giant mass of weenie balloons should take care of a couple issues

569

00:31:24,600 --> 00:31:26,600

with the balloon airbag.

570

00:31:26,600 --> 00:31:28,600

One, they won't separate,

571

00:31:28,600 --> 00:31:31,600

so the clown can't push right through them when he actually gets in the crash.

572

00:31:31,600 --> 00:31:34,600

And two, they're all a little under inflated,

573

00:31:34,600 --> 00:31:36,600

so that he can't pop them when he hits them.

574

00:31:36,600 --> 00:31:39,600

Besides, my clown sensei once said,

575

00:31:39,600 --> 00:31:42,600

one balloon, weak, mini balloons, strong.

576

00:31:43,600 --> 00:31:48,600

Meanwhile, Grant is also going for the more means less approach.

577

00:31:49,600 --> 00:31:51,600

You know what this is?

578

00:31:51,600 --> 00:31:53,600

That's right.

579

00:31:54,600 --> 00:31:57,600

It's a giant bubble wrap.

580

00:31:57,600 --> 00:32:02,600

Finally, there's Tori, who's combining balloons for a real knockout.

581

00:32:04,600 --> 00:32:06,600

I think we got a winner here.

582

00:32:06,600 --> 00:32:07,600

Yes, sir.

583

00:32:07,600 --> 00:32:10,600

All right, now what I'm going to do for my balloon airbag

584

00:32:10,600 --> 00:32:13,600

is take the giant latex balloons and the Mylar balloons.

585

00:32:13,600 --> 00:32:15,600

What I'm going to do is incorporate them too.

586

00:32:15,600 --> 00:32:18,600

I'm going to stuff the Mylar with the latex balloons,

587

00:32:18,600 --> 00:32:22,600

because one thing I want to do is keep the balloons together inside the Mylar,

588

00:32:22,600 --> 00:32:24,600

and hopefully that'll save his life.

589

00:32:25,600 --> 00:32:27,600

Okay, who's first?

590

00:32:27,600 --> 00:32:28,600

I say ladies first.

591

00:32:28,600 --> 00:32:30,600

You want the weenie whopper whoopie to go first?

592

00:32:30,600 --> 00:32:32,600

Yeah, let's do it.

593

00:32:33,600 --> 00:32:37,600

Just like last time, Carrie loads her design to the four-foot marker

594

00:32:37,600 --> 00:32:39,600

and then takes the plunge.

595

00:32:39,600 --> 00:32:40,600

Okay, here we go.

596

00:32:40,600 --> 00:32:43,600

In three, two, one.

597

00:32:44,600 --> 00:32:46,600

Oh, come on, that was so delicate.

598

00:32:46,600 --> 00:32:47,600

That looks pretty good.

599

00:32:47,600 --> 00:32:51,600

But unlike last time, they're not going to disclose the loads

600

00:32:51,600 --> 00:32:53,600

until each design has been dropped.

601

00:32:54,600 --> 00:32:58,600

Next up, Tori's four-heart coronary design.

602

00:33:00,600 --> 00:33:01,600

You know what I think?

603

00:33:01,600 --> 00:33:02,600

I think it's going to go.

604

00:33:03,600 --> 00:33:05,600

All right, this is stuffed balloons.

605

00:33:05,600 --> 00:33:06,600

Here we go.

606

00:33:06,600 --> 00:33:08,600

In three, two, one.

607

00:33:10,600 --> 00:33:11,600

That looked really good.

608

00:33:11,600 --> 00:33:12,600

Yeah.

609

00:33:13,600 --> 00:33:16,600

Last but not least, it's Grant's turn to go down.

610

00:33:17,600 --> 00:33:18,600

You guys ready for the magic?

611

00:33:18,600 --> 00:33:19,600

Yeah, showtime.

612

00:33:19,600 --> 00:33:22,600

In three, two, one.

613

00:33:25,600 --> 00:33:26,600

Oh, we got a couple of poppins.

614

00:33:26,600 --> 00:33:28,600

Hey, maybe more than a couple.

615

00:33:29,600 --> 00:33:30,600

All right, let's check it out.

616

00:33:31,600 --> 00:33:34,600

Like the two before it, Grant's rig looks vigorous,

617

00:33:34,600 --> 00:33:36,600

but who will come out on top?

618

00:33:37,600 --> 00:33:39,600

Okay, remember we're looking for number under 2G's,

619

00:33:39,600 --> 00:33:41,600

which is what our big balloons got.

620

00:33:41,600 --> 00:33:43,600

My contraption was 3.8.

621

00:33:43,600 --> 00:33:44,600

Well, it's been a nice guy.

622

00:33:44,600 --> 00:33:46,600

That's a pretty good score, though.

623

00:33:46,600 --> 00:33:47,600

Not really.

624

00:33:47,600 --> 00:33:48,600

You got 2.8.

625

00:33:48,600 --> 00:33:49,600

Oh, closer.

626

00:33:49,600 --> 00:33:52,600

And, Grant, you got 1.7.

627

00:33:52,600 --> 00:33:53,600

Hey, that's great.

628

00:33:53,600 --> 00:33:55,600

Now to go full scale.

629

00:33:55,600 --> 00:33:57,600

Oh, we got some work to do.

630

00:33:57,600 --> 00:33:59,600

So this is our winning scenario.

631

00:33:59,600 --> 00:34:02,600

It reduced the impact energy to 1.7G.

632

00:34:02,600 --> 00:34:05,600

Now what we need to do is make it 15 or 20 of them

633

00:34:05,600 --> 00:34:07,600

and stuff them into every part of the car

634

00:34:07,600 --> 00:34:09,600

and see if it saves the clown.

635

00:34:10,600 --> 00:34:11,600

On the other side of the break...

636

00:34:11,600 --> 00:34:13,600

Probably better if you don't watch.

637

00:34:13,600 --> 00:34:18,600

There's clown chaos and French torpedo hits pay dirt.

638

00:34:18,600 --> 00:34:19,600

Bye-bye!

639

00:34:26,600 --> 00:34:28,600

So far in our party balloon pile-up myth,

640

00:34:28,600 --> 00:34:31,600

nothing has been able to save the clown passengers' lives.

641

00:34:31,600 --> 00:34:33,600

But we are in the business of extreme.

642

00:34:33,600 --> 00:34:35,600

And that's why we have this.

643

00:34:35,600 --> 00:34:38,600

Is this something I like to call balloon bubble wrap?

644

00:34:39,600 --> 00:34:44,600

It got the lowest G-load of anything we tried in our drop tests.

645

00:34:44,600 --> 00:34:46,600

It's festive and protective.

646

00:34:46,600 --> 00:34:50,600

But will it be protective enough in a 35-mile-an-hour head-on?

647

00:34:50,600 --> 00:34:52,600

Probably better if you don't watch.

648

00:34:52,600 --> 00:34:57,600

To find out, the guys stuffed the car so it's literally fit to burst.

649

00:34:57,600 --> 00:35:00,600

You guys are packed in there like sardines.

650

00:35:03,600 --> 00:35:04,600

I don't want to do it.

651

00:35:05,600 --> 00:35:06,600

Now with this last and final test,

652

00:35:06,600 --> 00:35:10,600

we're trying to get below 100 G's on our clown.

653

00:35:10,600 --> 00:35:12,600

That is our benchmark for survivability.

654

00:35:12,600 --> 00:35:15,600

We've addressed all the problems that we've experienced with all the other balloons.

655

00:35:15,600 --> 00:35:18,600

We have small balloons on sheets of plastic.

656

00:35:18,600 --> 00:35:21,600

That way the clown can't push through the middle of the balloons.

657

00:35:21,600 --> 00:35:23,600

And if one little balloon breaks,

658

00:35:23,600 --> 00:35:27,600

it's not going to create a big cavity where the clown can actually fall into the windshield.

659

00:35:27,600 --> 00:35:31,600

It's a souped-up solution that's do or die for the myth.

660

00:35:31,600 --> 00:35:34,600

If this doesn't work, nothing will.

661

00:35:35,600 --> 00:35:42,600

Alright, here we go. This is bubble wrap in three, two, one.

662

00:35:49,600 --> 00:35:51,600

It did not look good.

663

00:35:53,600 --> 00:35:56,600

Let's go check the data for the party balloon column.

664

00:35:58,600 --> 00:36:01,600

Alright, so how did the clowns do with the balloon bubble wrap?

665

00:36:01,600 --> 00:36:07,600

Okay, so the passengers head peaked at 220 G's and his body at 230 G's.

666

00:36:07,600 --> 00:36:11,600

Wow, so the clowns actually experienced a bigger G load than in the previous test.

667

00:36:11,600 --> 00:36:16,600

So party balloons are not a substitute for airbags or seat belts.

668

00:36:16,600 --> 00:36:18,600

Stop clowning around.

669

00:36:32,600 --> 00:36:35,600

In three.

670

00:36:35,600 --> 00:36:43,600

Adam and Jamie's straight trench torpedo has just gone off with a bang.

671

00:36:43,600 --> 00:36:49,600

And as well as a sensational high speed, it's blown up some surprising results.

672

00:36:49,600 --> 00:36:53,600

Surprising because when compared to the open air control,

673

00:36:53,600 --> 00:36:57,600

it's clear that the straight trench amplifies the blast pressure.

674

00:36:57,600 --> 00:37:03,600

The question now is whether a corner can cause those numbers to drop down.

675

00:37:03,600 --> 00:37:09,600

And first up, it's the pinnacle of German engineering, the sharp-sided trench.

676

00:37:09,600 --> 00:37:14,600

This is the trench that the story's all about, the one with the sharp corners and right angles.

677

00:37:14,600 --> 00:37:19,600

And based on everything we've seen so far, by the time the blast wave gets to the end of this trench,

678

00:37:19,600 --> 00:37:22,600

past all these corners, it ought to be fairly small.

679

00:37:23,600 --> 00:37:24,600

Going down.

680

00:37:24,600 --> 00:37:29,600

To put Jamie's prediction and this myth to the test, the guys position the explosive package.

681

00:37:29,600 --> 00:37:31,600

Absolutely beautyous.

682

00:37:31,600 --> 00:37:34,600

And then deploy for detonation.

683

00:37:34,600 --> 00:37:35,600

You ready for this?

684

00:37:35,600 --> 00:37:37,600

Are you Gozar this time?

685

00:37:37,600 --> 00:37:38,600

I am Keymaster.

686

00:37:38,600 --> 00:37:39,600

Alright.

687

00:37:39,600 --> 00:37:40,600

Call it out.

688

00:37:40,600 --> 00:37:42,600

Right angle, sharp corner, trench.

689

00:37:42,600 --> 00:37:43,600

Yup.

690

00:37:43,600 --> 00:37:47,600

In three, two, one.

691

00:37:48,600 --> 00:37:49,600

Wow!

692

00:37:53,600 --> 00:37:55,600

I don't know, I think there's going to be a crater there.

693

00:37:55,600 --> 00:37:56,600

I think there might be.

694

00:37:56,600 --> 00:37:58,600

Let's go look at it.

695

00:37:58,600 --> 00:38:05,600

It's goodbye Yellowbrick Road as the blast tears through their trench.

696

00:38:05,600 --> 00:38:10,600

But at ground zero, to say the guys are happy is an understatement.

697

00:38:13,600 --> 00:38:14,600

Wow.

698

00:38:14,600 --> 00:38:15,600

Dude, check that out.

699

00:38:15,600 --> 00:38:20,600

I think this tells pretty much the whole story because that's intact.

700

00:38:20,600 --> 00:38:23,600

Everything up to that point is not.

701

00:38:23,600 --> 00:38:25,600

As you can see, this is the safe end of the trench.

702

00:38:25,600 --> 00:38:28,600

The further you go that way, the worse it gets.

703

00:38:28,600 --> 00:38:33,600

Now most of the energy seemed to travel down the trench and appears to have gotten absorbed

704

00:38:33,600 --> 00:38:36,600

by these corners based on how badly damaged they are.

705

00:38:36,600 --> 00:38:40,600

By the time you got here, there's not so much energy left.

706

00:38:40,600 --> 00:38:43,600

At 20 feet, the PSI was 60.

707

00:38:43,600 --> 00:38:46,600

At 30 feet, it was 19.

708

00:38:46,600 --> 00:38:49,600

And at 50 feet, it was just 7.

709

00:38:49,600 --> 00:38:52,600

A colossal contraction from their tunnel trench.

710

00:38:52,600 --> 00:38:56,600

But the myth says that only precise corners can shelter a shockwave.

711

00:38:56,600 --> 00:39:02,600

And to find out just that, it's time to end with another breathtaking bang.

712

00:39:02,600 --> 00:39:05,600

We're about to send another blast through another trench.

713

00:39:05,600 --> 00:39:09,600

And I'm standing right where the rubber meets the road for this entire story.

714

00:39:09,600 --> 00:39:16,600

This is where we will compare precision engineering versus your normal wear and tear of a soft cornered trench.

715

00:39:16,600 --> 00:39:22,600

I think my intuition tells me that the sharp corners are better and that we'll see a higher blast pressure

716

00:39:22,600 --> 00:39:24,600

at the end of this very trench.

717

00:39:24,600 --> 00:39:26,600

But only one way to find out.

718

00:39:26,600 --> 00:39:29,600

For the final time, the guys set up the PCB sensors.

719

00:39:29,600 --> 00:39:31,600

Look a little toasty.

720

00:39:31,600 --> 00:39:33,600

Position the projectile.

721

00:39:33,600 --> 00:39:35,600

There you go.

722

00:39:35,600 --> 00:39:37,600

And retreat to safety.

723

00:39:39,600 --> 00:39:47,600

Here we go. This is 25 pounds of explosives in a serpentine soft cornered trench.

724

00:39:47,600 --> 00:39:49,600

This is for real. This is for the money.

725

00:39:49,600 --> 00:39:53,600

Three, two, one. Bye-bye.

726

00:39:56,600 --> 00:39:58,600

Never get used to that.

727

00:39:58,600 --> 00:40:02,600

The serpentine salvo was a blast.

728

00:40:02,600 --> 00:40:10,600

And for Jamie, it's the high class high speed that seems to tell the story.

729

00:40:13,600 --> 00:40:19,600

Editors, let's pull up the high speed footage of the square cornered and the round cornered trench on splits.

730

00:40:19,600 --> 00:40:26,600

Okay. Now if we look at the fireballs in these two different trenches, we can see that in the square cornered trench

731

00:40:26,600 --> 00:40:30,600

the fireball stops moving just after the first corner.

732

00:40:30,600 --> 00:40:37,600

However, in the round cornered trench, the fireball passes the first corner and the second corner before it stops moving.

733

00:40:37,600 --> 00:40:44,600

Now, visually, that tells me that you're going to be in more trouble at the end of the round cornered trench.

734

00:40:47,600 --> 00:40:51,600

And that's something that the damage at rock bottom seems to agree with.

735

00:40:51,600 --> 00:40:53,600

More destruction.

736

00:40:54,600 --> 00:40:58,600

Hello.

737

00:40:58,600 --> 00:41:01,600

But what does the data dictate?

738

00:41:01,600 --> 00:41:03,600

Oh, I think we got some good data.

739

00:41:03,600 --> 00:41:06,600

I think we did. Let's get back to the shop and crunch it.

740

00:41:06,600 --> 00:41:07,600

Okay.

741

00:41:12,600 --> 00:41:13,600

What did the numbers say?

742

00:41:13,600 --> 00:41:17,600

I'm glad you asked. I have repaired this to explain them.

743

00:41:17,600 --> 00:41:18,600

What, did you make a cake?

744

00:41:18,600 --> 00:41:24,600

No, these are our four explosions and these numbers represent the blast pressures we got in those explosions.

745

00:41:24,600 --> 00:41:31,600

Okay. This is interesting. Yeah, I can see that the straight trench almost looks like it is amplifying the pressures

746

00:41:31,600 --> 00:41:35,600

because they're almost 10 times as high as the above-ground control test.

747

00:41:35,600 --> 00:41:40,600

Absolutely. And check out the difference between the right-angled trench and the serpentine trench.

748

00:41:40,600 --> 00:41:45,600

It's clear that the numbers in the serpentine trench are higher than the ones in the right-angled trench.

749

00:41:45,600 --> 00:41:48,600

I think these numbers tell us that this myth is plausible.

750

00:41:48,600 --> 00:41:49,600

So it is.

751

00:41:49,600 --> 00:41:51,600

Plausible.