1

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

on this episode of myth busters

2

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

we expected something and something happened

3

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

Adam and Jamie have a movie myth they were born for

4

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

can a gas leak and a magazine and a toaster

5

00:00:16,000 --> 00:00:19,000

but a little bit it's not going to be very happy in here

6

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

make a room go kaboom

7

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

I love running for safety

8

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

then I'm starting to get a little nervous

9

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

Carrie Grant and Tori tackle the tall tale of blue eyes

10

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

that is incredible

11

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

can the contents of an airplane's toilet really fall from the sky

12

00:00:36,000 --> 00:00:38,000

that thing is hauling

13

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

in one frozen chunk

14

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

this is an awesome day

15

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

who are the myth busters?

16

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

Adam Savage

17

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

oh god

18

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

and Jamie Heineman

19

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

am I really that ugly?

20

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

between them more than 30 years of special effects experience

21

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

joining them

22

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

Grant Imahara

23

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

Carrie Byron

24

00:01:02,000 --> 00:01:04,000

time to wreck this car

25

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

and Tori Bellegi

26

00:01:06,000 --> 00:01:08,000

we survived

27

00:01:08,000 --> 00:01:10,000

they don't just tell them this

28

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

they put them to the test

29

00:01:23,000 --> 00:01:25,000

have you seen the born supremacy?

30

00:01:25,000 --> 00:01:26,000

I love that movie

31

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

I love the whole born trilogy

32

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

have you got a myth from supremacy we can test?

33

00:01:30,000 --> 00:01:32,000

there's a scene where born broke into an apartment

34

00:01:32,000 --> 00:01:34,000

and he knows the bad guys are coming

35

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

so he has to make an escape

36

00:01:36,000 --> 00:01:38,000

what he does is he breaks the gas line

37

00:01:38,000 --> 00:01:40,000

where it goes into the stove to let the gas flow

38

00:01:40,000 --> 00:01:42,000

he grabs a magazine, shoves it in the toaster

39

00:01:42,000 --> 00:01:44,000

sets the toaster on

40

00:01:44,000 --> 00:01:46,000

and 20 seconds later

41

00:01:46,000 --> 00:01:48,000

when the magazine sets on fire

42

00:01:48,000 --> 00:01:50,000

the whole apartment blows up

43

00:01:52,000 --> 00:01:54,000

and so born makes his escape

44

00:01:54,000 --> 00:01:57,000

that's like perfect for us to test

45

00:01:57,000 --> 00:02:00,000

I think I have a pretty good idea where we should start

46

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

okay but before you tell me I actually want to demonstrate how much I love the born movies

47

00:02:04,000 --> 00:02:06,000

you know I collect movie props

48

00:02:06,000 --> 00:02:09,000

this is actually Jason Bourne's red bag from the Bourne identity

49

00:02:09,000 --> 00:02:11,000

in the wastebasket from the Swiss bank

50

00:02:11,000 --> 00:02:13,000

not only that it's actually full

51

00:02:13,000 --> 00:02:16,000

of all of the props that were actually in that bag in the film

52

00:02:16,000 --> 00:02:19,000

all his trinkets and even his stunt pistol

53

00:02:19,000 --> 00:02:21,000

it's made of rubber isn't that cool?

54

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

we need to find out whether a magazine would actually set on fire

55

00:02:26,000 --> 00:02:28,000

when it's put in a toaster

56

00:02:28,000 --> 00:02:30,000

okay

57

00:02:32,000 --> 00:02:35,000

there are three ingredients to this born style getaway

58

00:02:35,000 --> 00:02:37,000

the toaster, the magazine

59

00:02:37,000 --> 00:02:39,000

and the natural gas

60

00:02:39,000 --> 00:02:41,000

and first in the mix are one and two

61

00:02:41,000 --> 00:02:44,000

how long does it take to toast a magazine?

62

00:02:44,000 --> 00:02:46,000

you ready? I'm ready

63

00:02:46,000 --> 00:02:47,000

alright

64

00:02:47,000 --> 00:02:51,000

the guys start the clock using a magazine like the one in the movie

65

00:02:51,000 --> 00:02:54,000

and the toaster rigged to stay on

66

00:02:54,000 --> 00:02:58,000

you know in the movie it was already on fire at this point

67

00:02:58,000 --> 00:03:04,000

as it turns out toasting a magazine takes a little longer than the twenty seconds of the film

68

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

oh three minutes over schedule

69

00:03:06,000 --> 00:03:08,000

I think we're really close

70

00:03:08,000 --> 00:03:12,000

in fact it takes over twelve minutes before they get ignition

71

00:03:12,000 --> 00:03:14,000

hey we got fire

72

00:03:17,000 --> 00:03:20,000

remember kids we're professionals

73

00:03:22,000 --> 00:03:28,000

so reality is twelve minutes versus the movie's twenty five some odd seconds

74

00:03:28,000 --> 00:03:29,000

hey we got fire

75

00:03:29,000 --> 00:03:30,000

what do you think?

76

00:03:30,000 --> 00:03:34,000

well what I think is that this magazine is a worst case scenario

77

00:03:34,000 --> 00:03:37,000

because look how thick those pages are

78

00:03:37,000 --> 00:03:40,000

and magazines are all different shapes and sizes

79

00:03:40,000 --> 00:03:42,000

so you think we should try a whole bunch of different kinds of magazines

80

00:03:42,000 --> 00:03:45,000

and see if they have different rates at which they catch on fire

81

00:03:45,000 --> 00:03:46,000

exactly

82

00:03:46,000 --> 00:03:47,000

I love it let's do it

83

00:03:48,000 --> 00:03:50,000

lots of toasters now

84

00:03:50,000 --> 00:03:54,000

it's clear the real world magazine doesn't light up like its movie counterpart

85

00:03:54,000 --> 00:03:58,000

so now the mythbusters are on the trail of a best case scenario

86

00:03:59,000 --> 00:04:02,000

in order to cover our basis here and working up the theory that different types of magazines

87

00:04:02,000 --> 00:04:06,000

composed of different kinds of paper are going to catch a light at different rates

88

00:04:06,000 --> 00:04:09,000

we're about to put a half dozen of them to the test

89

00:04:09,000 --> 00:04:12,000

everything from our original magazine to something much harder to catch on fire

90

00:04:12,000 --> 00:04:16,000

comic book, something that will probably catch on fire in like seconds

91

00:04:16,000 --> 00:04:19,000

we're gonna put one in each of these toasters start this timer

92

00:04:19,000 --> 00:04:21,000

and log how long each of them takes to catch a light

93

00:04:21,000 --> 00:04:23,000

what could be more fun?

94

00:04:23,000 --> 00:04:26,000

well with the six magazines in place

95

00:04:26,000 --> 00:04:29,000

let the char grilling challenge commence

96

00:04:29,000 --> 00:04:33,000

we're experimentally doing something that should just never ever be done

97

00:04:33,000 --> 00:04:34,000

I like that

98

00:04:35,000 --> 00:04:36,000

oh flame

99

00:04:36,000 --> 00:04:37,000

number three

100

00:04:37,000 --> 00:04:39,000

one minute forty seconds

101

00:04:39,000 --> 00:04:43,000

this time around it seems the contenders are a little quicker to toast

102

00:04:44,000 --> 00:04:46,000

it's two twenty

103

00:04:46,000 --> 00:04:48,000

yep here we go

104

00:04:48,000 --> 00:04:49,000

number four

105

00:04:49,000 --> 00:04:51,000

three minutes fifteen seconds

106

00:04:51,000 --> 00:04:54,000

go number one three minutes twenty seconds

107

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

let's listen for that sound

108

00:04:58,000 --> 00:04:59,000

there we go

109

00:04:59,000 --> 00:05:00,000

there it is

110

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

four minutes thirty six seconds

111

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

and finally bring it up the rear

112

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

there it is

113

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

is the original magazine at twelve minutes

114

00:05:10,000 --> 00:05:15,000

as we suspected it does make a difference what kind of magazine is stuffed in the toaster

115

00:05:15,000 --> 00:05:19,000

the best case scenario is something that amounts to common newsprint

116

00:05:19,000 --> 00:05:24,000

but even that took about three times as long as what it did in the movie

117

00:05:24,000 --> 00:05:26,000

interesting

118

00:05:26,000 --> 00:05:34,000

so it's clear that even with the best case scenario magazine toaster ignition takes a lot longer than the twenty seconds it took born

119

00:05:35,000 --> 00:05:39,000

and now to test the next ingredient of this explosive combination

120

00:05:39,000 --> 00:05:41,000

the methane

121

00:05:41,000 --> 00:05:43,000

now methane here is a natural gas

122

00:05:43,000 --> 00:05:46,000

and it's most of what comes out of your stove at home to cook with

123

00:05:46,000 --> 00:05:49,000

it's a flammable gas but it's not flammable on its own

124

00:05:49,000 --> 00:05:53,000

it actually requires a certain amount of oxygen out of the air in order to burn

125

00:05:53,000 --> 00:05:55,000

how much oxygen?

126

00:05:55,000 --> 00:05:57,000

well that actually turns out to be a very particular relationship

127

00:05:57,000 --> 00:06:01,000

the relationship of oxygen to flammable gas is called stoichiometry

128

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

to create fire it takes heat, fuel and oxygen

129

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

and when it comes to flammable gases the amount of fuel to oxygen is a complex relationship called

130

00:06:12,000 --> 00:06:14,000

stoichiometry

131

00:06:14,000 --> 00:06:16,000

too much fuel or too little

132

00:06:16,000 --> 00:06:18,000

and there'll be nothing close to a flame

133

00:06:18,000 --> 00:06:21,000

but get the perfect mixture and you get an explosion

134

00:06:22,000 --> 00:06:29,000

now according to the movie it took born twenty seconds to get that explosive ratio of air to gas just right

135

00:06:29,000 --> 00:06:34,000

so now the mythbusters are dialing in to find out exactly what it is

136

00:06:35,000 --> 00:06:44,000

we know that if we're going to get methane to burn we need a ratio of between 6 and 17% fuel to air

137

00:06:44,000 --> 00:06:48,000

the ideal range is about 9% methane in the rest of air

138

00:06:48,000 --> 00:06:51,000

what we don't know is what that actually means

139

00:06:51,000 --> 00:06:54,000

does that mean if we are a little off we get sort of a woof

140

00:06:54,000 --> 00:06:58,000

but if we get right at the 9% we're getting a real strong bang

141

00:06:58,000 --> 00:07:02,000

before we go full scale we want to really know what we're doing

142

00:07:02,000 --> 00:07:08,000

so what we've done is make a 10 inch by 10 inch by 10 inch cubic box

143

00:07:08,000 --> 00:07:14,000

and that will allow us to really easily dial in on these ratios to see what it means

144

00:07:14,000 --> 00:07:18,000

and while Jamie is boxing Adam has the ratios in the bag

145

00:07:18,000 --> 00:07:22,000

one of the ratios I want to play with is 9% flammable gas to air

146

00:07:22,000 --> 00:07:26,000

this bag holds 9% of the volume of this chamber

147

00:07:26,000 --> 00:07:28,000

I will fill it with gas

148

00:07:29,000 --> 00:07:32,000

I will then hook it up to the chamber

149

00:07:32,000 --> 00:07:35,000

open up both of the valves

150

00:07:35,000 --> 00:07:37,000

press the gas into the chamber

151

00:07:37,000 --> 00:07:40,000

I'll be displacing air that comes out of this little hole right here

152

00:07:40,000 --> 00:07:45,000

seal it up, walk away, ignite it with a neon transformer and see what happens

153

00:07:45,000 --> 00:07:51,000

Adam's bags will help the guy zone in on exactly what ratio of methane to air is explosive

154

00:07:51,000 --> 00:07:53,000

and speaking of methane

155

00:07:53,000 --> 00:07:58,000

so that we can ignite this thing safely we're going to remotely turn on this neon transformer

156

00:07:58,000 --> 00:08:02,000

that will create a high voltage spark inside the methane chamber

157

00:08:02,000 --> 00:08:08,000

and here we'll be able to vary the methane concentrations, ignite it and see what we get

158

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

first up, a test at the very bottom of the stoichiometric zone, 6%

159

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

we're good

160

00:08:14,000 --> 00:08:16,000

okay, 6%

161

00:08:16,000 --> 00:08:20,000

and 3, 2, 1

162

00:08:24,000 --> 00:08:27,000

we expected something and something happened

163

00:08:32,000 --> 00:08:36,000

a fragile box separated just as we hoped it would

164

00:08:36,000 --> 00:08:38,000

and it's actually kind of a little bit of a...

165

00:08:38,000 --> 00:08:39,000

boom

166

00:08:39,000 --> 00:08:42,000

I was expecting a little more from an explosion

167

00:08:42,000 --> 00:08:46,000

and I'm interested to see if our optimal stoichiometric ratio gives us that

168

00:08:46,000 --> 00:08:47,000

me too

169

00:08:47,000 --> 00:08:48,000

well let's set it up

170

00:08:48,000 --> 00:08:49,000

okay

171

00:08:49,000 --> 00:08:56,000

6% is explosive, but what if Borne achieved the optimal ratio of 9% methane to air

172

00:08:56,000 --> 00:09:00,000

9% and 3, 2, 1

173

00:09:04,000 --> 00:09:06,000

well that was more energetic

174

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

9% was definitely more energetic

175

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

but for Adam the surprising thing is that at both ratios they scored the mythical explosion they're looking for

176

00:09:16,000 --> 00:09:18,000

this is awesome

177

00:09:18,000 --> 00:09:21,000

we think that 6% means we'll see a small pop

178

00:09:21,000 --> 00:09:23,000

9% means we'll see a big pop

179

00:09:23,000 --> 00:09:25,000

in this case that's not the case

180

00:09:25,000 --> 00:09:27,000

and that actually makes it look better for this myth

181

00:09:27,000 --> 00:09:31,000

if we're getting a pop at the very lowest end of the stoichiometric range

182

00:09:31,000 --> 00:09:38,000

that's making Borne's use of this as a diversion technique more feasible

183

00:09:38,000 --> 00:09:41,000

I'm not saying it's probable, but it's making it look more feasible

184

00:09:46,000 --> 00:09:47,000

it ain't pretty but it's home

185

00:09:47,000 --> 00:09:49,000

but can the myth bring it down

186

00:09:49,000 --> 00:09:54,000

and Carrie takes to the skies on the tale of blue ice

187

00:09:54,000 --> 00:09:55,000

both?

188

00:10:07,000 --> 00:10:08,000

you're looking excited

189

00:10:08,000 --> 00:10:12,000

that's because we have a myth that's spectacular, gross and challenging

190

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

I'll wrap it up into one

191

00:10:13,000 --> 00:10:14,000

what's the story?

192

00:10:14,000 --> 00:10:17,000

it's the one where the pilot jettisons the contents of an airplane toilet

193

00:10:17,000 --> 00:10:21,000

which promptly freezes its altitude and turns into a deadly projectile

194

00:10:21,000 --> 00:10:23,000

you're talking about the myth of blue ice

195

00:10:23,000 --> 00:10:24,000

exactly

196

00:10:27,000 --> 00:10:31,000

when mysterious substances of suspect origin fall from the sky

197

00:10:31,000 --> 00:10:34,000

urban myths are sure to follow

198

00:10:35,000 --> 00:10:39,000

and the conspiracy theory that has the message boards in a spin

199

00:10:39,000 --> 00:10:41,000

is the infamous blue ice

200

00:10:41,000 --> 00:10:43,000

and here's how it happens

201

00:10:44,000 --> 00:10:51,000

on a bright sunny day, a passing pilot supposedly jettisons the contents of the toilet's tank

202

00:10:51,000 --> 00:10:56,000

and apparently at high altitudes, the sub-zero temperatures freeze the liquid

203

00:10:56,000 --> 00:11:00,000

into a damaging and disgusting missile

204

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

alright, we know a little bit about airplane toilets because we did a myth on them

205

00:11:07,000 --> 00:11:10,000

we know for a fact you can't get sucked into them if you're sitting down

206

00:11:10,000 --> 00:11:14,000

and we know the reason why it's blue is because they use that chemical to cover the smell

207

00:11:14,000 --> 00:11:17,000

but what we don't know is, what happens to the waste?

208

00:11:17,000 --> 00:11:20,000

yeah, can you actually eject the contents in mid-air?

209

00:11:20,000 --> 00:11:22,000

I guess this is where we start

210

00:11:23,000 --> 00:11:30,000

so first up, Carrie hits Stockton Airport to find out when and how a pilot dumps his waste

211

00:11:31,000 --> 00:11:34,000

so you're an airplane technician, what do you think of our old blue ice myth?

212

00:11:34,000 --> 00:11:37,000

well, Carrie, as you can see from this cockpit

213

00:11:37,000 --> 00:11:42,000

there are thousands of buttons and switches of which none are labeled, dump the toilet

214

00:11:43,000 --> 00:11:45,000

which is bad news for the myth

215

00:11:45,000 --> 00:11:51,000

but if the pilot can't jettison the John mid-flight, is there anyway the liquid blue waste can escape?

216

00:11:52,000 --> 00:11:54,000

failure of components

217

00:11:54,000 --> 00:11:57,000

so there could be a mechanical problem that causes blue ice instead of the pilot?

218

00:11:57,000 --> 00:12:01,000

yes, like with most systems on an airplane there are redundancies

219

00:12:01,000 --> 00:12:03,000

and with the lab it's no different

220

00:12:03,000 --> 00:12:08,000

yep, there are three fail safes that have to be breached in order for the liquid to leak

221

00:12:08,000 --> 00:12:10,000

the dump valve on the holding tank

222

00:12:10,000 --> 00:12:15,000

and two watertight seals leading to the exterior of the fuselage

223

00:12:15,000 --> 00:12:19,000

if all three of those components fail, that's a problem

224

00:12:20,000 --> 00:12:22,000

it's not likely, is it possible?

225

00:12:22,000 --> 00:12:26,000

absolutely, multiple components that fail leading to a problem

226

00:12:26,000 --> 00:12:28,000

this myth is looking good

227

00:12:28,000 --> 00:12:30,000

there's my baby

228

00:12:31,000 --> 00:12:33,000

all right, Carrie, so how did it go?

229

00:12:33,000 --> 00:12:37,000

well, part of this myth isn't looking good, there's no way for the pilot to jettison the contents of the toilet

230

00:12:37,000 --> 00:12:40,000

true, but that doesn't rule out ice falling off the plane

231

00:12:40,000 --> 00:12:43,000

that's right, there's still two scenarios that could happen

232

00:12:43,000 --> 00:12:48,000

there could be a major malfunction that leads to either all of the contents coming out at once, freezing and falling to earth

233

00:12:48,000 --> 00:12:51,000

or you could get a nice slow leak that created an ice ball

234

00:12:51,000 --> 00:12:53,000

now the question is, how are we going to test them?

235

00:12:53,000 --> 00:12:55,000

actually, we've been talking to our friends at NASA

236

00:12:55,000 --> 00:12:58,000

and they've agreed to let us use their icing research tunnel

237

00:12:58,000 --> 00:13:02,000

which can simultaneously duplicate temperatures of minus 20 degrees

238

00:13:02,000 --> 00:13:05,000

and wind speeds of up to 250 knots

239

00:13:05,000 --> 00:13:07,000

that is the perfect conditions for high altitude

240

00:13:07,000 --> 00:13:11,000

well, it sounds like before we leave, we're going to have to build a leaky airplane toilet

241

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

now, this myth is about airplanes, but in order to test it, we don't need to build a full airplane

242

00:13:18,000 --> 00:13:23,000

all we need to do is make something that has similar aerodynamic properties

243

00:13:23,000 --> 00:13:25,000

so, this is our design

244

00:13:25,000 --> 00:13:29,000

and this will have low drag and

245

00:13:31,000 --> 00:13:34,000

a place to leak, which are the most important things

246

00:13:34,000 --> 00:13:40,000

so for their tests at NASA, Cary builds a waste system designed to fail in two ways

247

00:13:40,000 --> 00:13:42,000

either with a slow leak

248

00:13:42,000 --> 00:13:44,000

or a catastrophic dump

249

00:13:45,000 --> 00:13:48,000

now, according to NASA's specs, it had to be out of aluminum

250

00:13:48,000 --> 00:13:49,000

because that's what airplanes are made of

251

00:13:49,000 --> 00:13:51,000

and we were not allowed to weld anything

252

00:13:51,000 --> 00:13:54,000

because they didn't want anything breaking apart inside the wind tunnel

253

00:13:54,000 --> 00:13:57,000

because there's going to be so much pressure created by the wind

254

00:13:57,000 --> 00:14:03,000

so, we had to drill and rivet over 600 rivets to put our airplane together

255

00:14:03,000 --> 00:14:05,000

and what we have right here is our valve

256

00:14:05,000 --> 00:14:07,000

this is what we're going to have hooked up to a water tank

257

00:14:07,000 --> 00:14:09,000

and we're going to be doing two tests

258

00:14:09,000 --> 00:14:11,000

one where we dump the water completely

259

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

and then one where there's a slow leak

260

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

to find out, can you grow a chunk of ice on the side of a plane?

261

00:14:21,000 --> 00:14:25,000

Jason Bourne knows how to make an explosive exit

262

00:14:25,000 --> 00:14:30,000

but could a magazine and a toaster really toast a gas-filled apartment?

263

00:14:32,000 --> 00:14:37,000

after getting to know their enemy in the shop, the guys are ready to go full scale

264

00:14:42,000 --> 00:14:46,000

if we're going to replicate the natural gas explosion in the sky's apartment from the movie

265

00:14:46,000 --> 00:14:48,000

we're going to need clearly two things

266

00:14:48,000 --> 00:14:51,000

yeah, they said get your own show with a lopet all sorts of doors

267

00:14:51,000 --> 00:14:55,000

one is methane, natural gas, which is easy to get

268

00:14:55,000 --> 00:14:58,000

and two is the guy's apartment, which we don't actually have

269

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

so, we've come out to the bomb range where they've got plenty of room

270

00:15:01,000 --> 00:15:05,000

and in a few hours, we're going to build this guy's apartment

271

00:15:05,000 --> 00:15:09,000

not to code, we just need it to be a gas containment device

272

00:15:09,000 --> 00:15:13,000

in the shape of the apartment, but it will be properly appointed, I'm sure

273

00:15:13,000 --> 00:15:20,000

so to find out if you really can get a room to kaboom with just gas, a magazine and a toaster

274

00:15:20,000 --> 00:15:24,000

they'll precisely replicate the circumstances of the movie

275

00:15:24,000 --> 00:15:28,000

starting with the apartment dimensions, 16 by 32 feet

276

00:15:28,000 --> 00:15:31,000

once the roof has been successfully raised

277

00:15:31,000 --> 00:15:36,000

it's time for the resident exterior decorator to take over

278

00:15:36,000 --> 00:15:42,000

after you blow enough things up, you start to look for aesthetic finesse in the explosion

279

00:15:42,000 --> 00:15:46,000

I'll give you an example, first hot water heater, we painted that little house red

280

00:15:51,000 --> 00:15:53,000

look at that, isn't that beautiful?

281

00:15:53,000 --> 00:15:56,000

so we're going to give the same treatment to this thing, we're going to paint the outside

282

00:15:56,000 --> 00:16:01,000

and lovely orange so that when it finally blows up, the high speed shot will be especially gorgeous

283

00:16:01,000 --> 00:16:05,000

well it certainly will be explosively tangerine

284

00:16:10,000 --> 00:16:15,000

there, I wouldn't call it livable, but I'd call it blow-up-able

285

00:16:15,000 --> 00:16:22,000

it is blow-up-able and the final finishing touches are to furnish it before they step on the gas

286

00:16:23,000 --> 00:16:28,000

excellent, that's got a nice view here, you know, the valley out the window there

287

00:16:29,000 --> 00:16:33,000

the house may be complete, but soon it'll be filled with highly flammable gas

288

00:16:33,000 --> 00:16:38,000

and in the event they don't get a ignition, Adam has created this

289

00:16:38,000 --> 00:16:43,000

what I've got here is an exhaust system so that I can evacuate the gas from this room

290

00:16:43,000 --> 00:16:47,000

because one of the most dangerous things that could happen to us in this experiment is nothing

291

00:16:47,000 --> 00:16:52,000

we found this on cell phone destroy gas station, we had a room full of gasoline fumes

292

00:16:52,000 --> 00:16:56,000

and we didn't get it to ignite and nobody wants to approach a room full of fumes

293

00:16:56,000 --> 00:16:58,000

hello explosion, hello

294

00:16:58,000 --> 00:17:03,000

so if nothing happens, I've got a switch I can turn that will start these fans all up

295

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

and get all the gas out of this room so it's safe to do a reset

296

00:17:07,000 --> 00:17:12,000

I think that's the last piece of the puzzle, I'll get to a safe location

297

00:17:12,000 --> 00:17:16,000

and that's not the only safety precaution they're taking with this test

298

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

this is our methane outlet which has tinsel on it

299

00:17:20,000 --> 00:17:25,000

which we will be able to see moving if gas is coming through here on our remote camera

300

00:17:27,000 --> 00:17:31,000

this is our tank of methane, we have a regulator and a flow meter attached to it

301

00:17:31,000 --> 00:17:36,000

now this rig is set up to give us the same kind of input of gas into our house

302

00:17:36,000 --> 00:17:41,000

as you would normally have in a domestic gas line going into an apartment

303

00:17:41,000 --> 00:17:46,000

now this valve here I have with a line attached to it that goes to our bunker

304

00:17:46,000 --> 00:17:51,000

and I'm going to pull on this line if there's anything that bothers me about this setting

305

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

because you know it's gas, it's flammable

306

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

if there's something we don't like we want to be able to shut it off

307

00:17:59,000 --> 00:18:03,000

and from this distance I can safely pull the plug if there's something I don't like

308

00:18:04,000 --> 00:18:07,000

the list of things Jamie doesn't like may be a long one

309

00:18:07,000 --> 00:18:10,000

but if the explosion of the movie is anything to go by

310

00:18:10,000 --> 00:18:14,000

putting this myth to the test could be very dangerous

311

00:18:14,000 --> 00:18:16,000

well shall we get started?

312

00:18:16,000 --> 00:18:17,000

yeah

313

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

after you

314

00:18:20,000 --> 00:18:22,000

next up it's full speed ahead

315

00:18:22,000 --> 00:18:24,000

all stations reporting with a go no go

316

00:18:24,000 --> 00:18:27,000

but will the blue ice myth be blown away?

317

00:18:33,000 --> 00:18:37,000

Carrie Grant and Tori are tackling the infamous tall tale of blue ice

318

00:18:37,000 --> 00:18:42,000

can a leaking toilet midair lead to a deadly chunk of ice down there

319

00:18:46,000 --> 00:18:47,000

to find out for sure

320

00:18:48,000 --> 00:18:49,000

cool

321

00:18:53,000 --> 00:18:55,000

all stations reporting with a go no go

322

00:18:58,000 --> 00:19:02,000

because this place has a heap of hardcore hardware

323

00:19:02,000 --> 00:19:05,000

this massive fan is the heart of NASA's icing tunnel

324

00:19:05,000 --> 00:19:10,000

it's powered by 5000 horsepower direct drive electric motor

325

00:19:10,000 --> 00:19:15,000

it has 12 individual custom fan blades for a diameter of 25 feet

326

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

it's capable of generating wind speeds over 300 knots

327

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

and that's only half the equation

328

00:19:21,000 --> 00:19:23,000

this is the other half of the equation

329

00:19:23,000 --> 00:19:25,000

the icing tunnel itself

330

00:19:25,000 --> 00:19:27,000

the wind comes rushing through here

331

00:19:27,000 --> 00:19:29,000

refrigerated to minus 20 degrees Fahrenheit

332

00:19:30,000 --> 00:19:32,000

those are the spectacular specs

333

00:19:32,000 --> 00:19:34,000

and now to put them to good use

334

00:19:34,000 --> 00:19:39,000

the way we're going to test this is we're going to stick our section of fuselage into their wind tunnel

335

00:19:39,000 --> 00:19:41,000

this is me now in the R2-D2

336

00:19:41,000 --> 00:19:42,000

oh boy

337

00:19:42,000 --> 00:19:47,000

and recreate the same wind speeds and temperatures that you would find at altitude

338

00:19:47,000 --> 00:19:50,000

then we're going to create a leak inside the valve

339

00:19:50,000 --> 00:19:57,000

let it sit there and see if those conditions will cause that blue liquid to form into a chunk of ice

340

00:19:57,000 --> 00:20:01,000

remember there are two leaky valve scenarios the team will test

341

00:20:01,000 --> 00:20:04,000

and first up is the catastrophic dump

342

00:20:05,000 --> 00:20:07,000

we have our model in position we're ready to go

343

00:20:07,000 --> 00:20:09,000

alright fire it up

344

00:20:09,000 --> 00:20:11,000

alright let's go fire it up

345

00:20:11,000 --> 00:20:13,000

maximum warp

346

00:20:13,000 --> 00:20:15,000

oh sorry just made that really deep

347

00:20:15,000 --> 00:20:17,000

we're trying to make science cool dude

348

00:20:17,000 --> 00:20:18,000

here we go

349

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

and for cool science let's make it so

350

00:20:24,000 --> 00:20:28,000

the fan winds up whipping up a 290 mile an hour wind speed

351

00:20:29,000 --> 00:20:35,000

then the heat exchanger drops the air temperature to a high altitude minus 20 degrees Celsius

352

00:20:36,000 --> 00:20:39,000

our model is holding together perfectly

353

00:20:40,000 --> 00:20:44,000

then they're ready to pull the pin on the catastrophic failure test

354

00:20:44,000 --> 00:20:48,000

will the blue liquid instantly freeze into a chunk of blue ice

355

00:20:49,000 --> 00:20:56,000

so this is full tagged up in 3, 2, 1, go

356

00:21:00,000 --> 00:21:02,000

oh my god

357

00:21:03,000 --> 00:21:05,000

look at how fast it's going out

358

00:21:05,000 --> 00:21:07,000

that is awesome

359

00:21:08,000 --> 00:21:13,000

as soon as the liquid exits the aircraft it's ripped away by the shearing force of the wind

360

00:21:13,000 --> 00:21:19,000

and despite the bitterly cold air temperatures it's unable to form the mythical slice of ice

361

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

so behind me are the results of our complete release test where we dumped the entire contents of the waste tank

362

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

now it didn't atomize all the way because you can see some of it formed on the surface here

363

00:21:32,000 --> 00:21:37,000

but it also did not form one big chunk that could fall on some

364

00:21:37,000 --> 00:21:41,000

yep although most of the blue waste was vaporized on contact with the wind

365

00:21:41,000 --> 00:21:46,000

some did form a thin layer just not enough for a blue icicle

366

00:21:47,000 --> 00:21:51,000

but I mean it's incredible we got an actual layer of ice and pretty quickly

367

00:21:51,000 --> 00:21:54,000

alright well let's try again and this time have a slow leak

368

00:21:54,000 --> 00:21:57,000

alright let's see if that gives us a big chunk of ice

369

00:21:57,000 --> 00:22:01,000

once again the NASA techs simulate the same high altitude conditions

370

00:22:01,000 --> 00:22:05,000

and then sabotage the plumbing for the drip test

371

00:22:06,000 --> 00:22:08,000

and once the leak is leaking

372

00:22:10,000 --> 00:22:11,000

oh my god

373

00:22:11,000 --> 00:22:13,000

oh look how quick the ice is building up

374

00:22:13,000 --> 00:22:16,000

the results are as astonishing as they are immediate

375

00:22:16,000 --> 00:22:18,000

this is looking great and it's blue

376

00:22:18,000 --> 00:22:20,000

that is fantastic

377

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

it hasn't even been 2 minutes yet

378

00:22:23,000 --> 00:22:24,000

oh my gosh

379

00:22:24,000 --> 00:22:26,000

that is incredible

380

00:22:28,000 --> 00:22:33,000

the liquid moving over the surface of the aircraft is protected from the extreme wind speeds

381

00:22:33,000 --> 00:22:36,000

by what's called a boundary layer

382

00:22:36,000 --> 00:22:42,000

what that means is that not all the air traveling over the airplane goes at the same rate

383

00:22:42,000 --> 00:22:46,000

certain areas that actually travels a lot slower

384

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

which creates a protective cushion where ice crystals can form

385

00:22:51,000 --> 00:22:53,000

this thing is like this big

386

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

I call that baseball size right there

387

00:22:55,000 --> 00:22:59,000

if that whole thing broke off that would be just like the mid

388

00:22:59,000 --> 00:23:01,000

the guys are blown away

389

00:23:01,000 --> 00:23:03,000

unlike the ice

390

00:23:03,000 --> 00:23:07,000

question is how big can it get and will it fall off

391

00:23:08,000 --> 00:23:10,000

you can't believe how big it's getting

392

00:23:10,000 --> 00:23:13,000

20 minutes later with a diameter around 10 inches

393

00:23:13,000 --> 00:23:17,000

the blue icicles seems to have reached a size plateau

394

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

it's approaching soccer ball size

395

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

and with plenty of water still in the tank

396

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

that's not the limiting factor

397

00:23:25,000 --> 00:23:28,000

but Grant thinks he knows what is

398

00:23:28,000 --> 00:23:30,000

now an interesting thing to note here

399

00:23:30,000 --> 00:23:33,000

is that as the ice is getting thicker and pushing away from the skin

400

00:23:33,000 --> 00:23:36,000

it's actually pushing its way out of the boundary layer

401

00:23:36,000 --> 00:23:38,000

once it exits the boundary layer

402

00:23:38,000 --> 00:23:41,000

it actually hits the fashion of moving air and just goes away

403

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

it doesn't allow it to freeze up

404

00:23:43,000 --> 00:23:47,000

which may be a reason why the ice doesn't get really really big

405

00:23:47,000 --> 00:23:49,000

but let's see if we can get it to fall off

406

00:23:49,000 --> 00:23:51,000

let's pretend like it's at its final descent

407

00:23:51,000 --> 00:23:53,000

temperatures are rising

408

00:23:53,000 --> 00:23:56,000

maybe we can get it to break off and find out exactly what happens when it does

409

00:23:56,000 --> 00:23:58,000

perfect

410

00:23:58,000 --> 00:24:00,000

alright start warming it up

411

00:24:00,000 --> 00:24:03,000

it's a good theory because as the aircraft descends

412

00:24:03,000 --> 00:24:05,000

and the air temperature warms

413

00:24:06,000 --> 00:24:08,000

oh we're getting bigger chugs breaking off

414

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

surely it's only a matter of time before the blue ice particle

415

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

becomes a blue ice missile

416

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

minus seven degrees

417

00:24:16,000 --> 00:24:20,000

and as it turns out when the wind tunnel conditions match those of an altitude of

418

00:24:20,000 --> 00:24:22,000

twelve thousand feet

419

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

ohhhh

420

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

we have lift off

421

00:24:26,000 --> 00:24:28,000

that's the blue up in one giant chunk

422

00:24:28,000 --> 00:24:30,000

wow

423

00:24:30,000 --> 00:24:32,000

that was perfect

424

00:24:32,000 --> 00:24:36,000

this myth is starting to look very very believable

425

00:24:36,000 --> 00:24:38,000

yeah but you know the next step is

426

00:24:38,000 --> 00:24:41,000

what happens to the ice after it falls off

427

00:24:41,000 --> 00:24:43,000

I can't believe it

428

00:24:43,000 --> 00:24:44,000

coming up later

429

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

oh sh** we're burning this building down

430

00:24:50,000 --> 00:24:54,000

here's the story we're testing

431

00:24:54,000 --> 00:24:55,000

Jason Bourne

432

00:24:55,000 --> 00:24:56,000

knowing that the bad guys are coming

433

00:24:56,000 --> 00:24:59,000

wanting to buy himself a little extra time for the chase

434

00:24:59,000 --> 00:25:01,000

opens up the gas line

435

00:25:01,000 --> 00:25:03,000

of the house he's in

436

00:25:04,000 --> 00:25:06,000

walks over to a toaster

437

00:25:06,000 --> 00:25:09,000

grabs a magazine and sticks it in that toaster

438

00:25:09,000 --> 00:25:11,000

and sets it as a remote fuse

439

00:25:11,000 --> 00:25:13,000

and then he exits the house

440

00:25:14,000 --> 00:25:18,000

thirty seconds later a massive explosion

441

00:25:19,000 --> 00:25:21,000

gives him the lead time he's looking for

442

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

now is that remotely plausible

443

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

well those are the circumstances we've got set up in this house right here

444

00:25:26,000 --> 00:25:28,000

and that's going to be our first test

445

00:25:28,000 --> 00:25:31,000

in other words this test will be exactly like the movie

446

00:25:31,000 --> 00:25:33,000

but with one exception

447

00:25:34,000 --> 00:25:37,000

according to our testing it actually takes about two minutes

448

00:25:37,000 --> 00:25:40,000

for the toaster to set the magazine on fire

449

00:25:40,000 --> 00:25:42,000

so that means that we've had about

450

00:25:42,000 --> 00:25:45,000

four times the amount of gas going into the room

451

00:25:45,000 --> 00:25:48,000

and that two minutes is what Bourne had

452

00:25:48,000 --> 00:25:50,000

for the whole house to blow up

453

00:25:50,000 --> 00:25:52,000

now that two minutes in our case

454

00:25:52,000 --> 00:25:55,000

is only allowing about seven cubic feet of methane

455

00:25:55,000 --> 00:25:57,000

to go into the house

456

00:25:57,000 --> 00:25:59,000

and it's rising towards the roof

457

00:25:59,000 --> 00:26:03,000

meanwhile our source of ignition is about fifteen feet away

458

00:26:03,000 --> 00:26:06,000

I don't expect to see any kind of explosion at all

459

00:26:06,000 --> 00:26:08,000

and that's down to stoichiometry

460

00:26:08,000 --> 00:26:10,000

in theory for a room this size

461

00:26:10,000 --> 00:26:14,000

seven cubic feet of methane will be too low a concentration

462

00:26:14,000 --> 00:26:16,000

to ignite

463

00:26:16,000 --> 00:26:17,000

alright I'm ready

464

00:26:17,000 --> 00:26:19,000

okay Adam go ahead and turn on the gas

465

00:26:19,000 --> 00:26:20,000

copy that

466

00:26:20,000 --> 00:26:22,000

but this is Mythbusters

467

00:26:22,000 --> 00:26:24,000

and it's not a fact until you test it

468

00:26:25,000 --> 00:26:27,000

it's pretty eerie watching

469

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

valuable gas go into a room in which we've started a fire

470

00:26:30,000 --> 00:26:32,000

or about to

471

00:26:35,000 --> 00:26:36,000

oh I see some fire

472

00:26:36,000 --> 00:26:38,000

fire great alright

473

00:26:38,000 --> 00:26:40,000

the magazine may finally be on fire

474

00:26:40,000 --> 00:26:42,000

but the methane is not igniting

475

00:26:42,000 --> 00:26:44,000

oh man that toaster is totally burning

476

00:26:44,000 --> 00:26:47,000

and even after a further sixty seconds

477

00:26:47,000 --> 00:26:50,000

there's still no hint of a Hollywood blast

478

00:26:50,000 --> 00:26:51,000

gas is off

479

00:26:51,000 --> 00:26:54,000

starting up the fans to evacuate the room

480

00:26:56,000 --> 00:26:57,000

that was cool

481

00:26:57,000 --> 00:26:58,000

that was very cool

482

00:26:58,000 --> 00:26:59,000

I was a little tense

483

00:26:59,000 --> 00:27:01,000

a flammable gas, a fire

484

00:27:01,000 --> 00:27:02,000

no boom

485

00:27:02,000 --> 00:27:03,000

no boom

486

00:27:03,000 --> 00:27:07,000

so it's time to send in the Mythbusters fire brigade

487

00:27:09,000 --> 00:27:10,000

oh yeah

488

00:27:12,000 --> 00:27:13,000

there's your problem

489

00:27:17,000 --> 00:27:21,000

so we replicated all the circumstances for Bourne's evasion technique

490

00:27:21,000 --> 00:27:22,000

and it totally didn't work

491

00:27:22,000 --> 00:27:25,000

I think that's a pretty clean busting of the myth

492

00:27:25,000 --> 00:27:26,000

yeah it's busted

493

00:27:26,000 --> 00:27:28,000

but you know I was thinking

494

00:27:28,000 --> 00:27:31,000

if we put something in that room that burned for longer

495

00:27:31,000 --> 00:27:33,000

eventually something's gonna happen

496

00:27:33,000 --> 00:27:37,000

you mean eventually the gas and the air will reach a mixture

497

00:27:37,000 --> 00:27:39,000

whereby we will get some kind of reaction

498

00:27:39,000 --> 00:27:40,000

yeah

499

00:27:40,000 --> 00:27:43,000

I love it I think that should be the next test

500

00:27:43,000 --> 00:27:45,000

although the exact circumstances of the movie

501

00:27:45,000 --> 00:27:47,000

won't get the bad guys off your tail

502

00:27:47,000 --> 00:27:50,000

the question is could a little more gas

503

00:27:50,000 --> 00:27:54,000

and a longer fuse get the big Bourne boom

504

00:27:54,000 --> 00:27:56,000

we know from our small scale testing in our research

505

00:27:56,000 --> 00:28:00,000

that it takes a minimum six percent fuel to air mix

506

00:28:00,000 --> 00:28:03,000

for methane and air to support ignition

507

00:28:03,000 --> 00:28:05,000

the way we've got it planned out

508

00:28:05,000 --> 00:28:07,000

if we take the contents of this methane tank

509

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

and put it in our test room

510

00:28:09,000 --> 00:28:12,000

we'll have the right fuel air mix

511

00:28:12,000 --> 00:28:14,000

how are we gonna get a long burning open flame

512

00:28:14,000 --> 00:28:16,000

well we're throwing out the toaster in the magazine

513

00:28:16,000 --> 00:28:19,000

and we're going with a supermarket fireplace log

514

00:28:19,000 --> 00:28:22,000

light this puppy on fire it'll burn for at least an hour

515

00:28:22,000 --> 00:28:23,000

this is for real

516

00:28:23,000 --> 00:28:27,000

the log will burn while the gas builds to the six percent ratio

517

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

that's it

518

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

but when it hits the stoichiometric zone

519

00:28:31,000 --> 00:28:34,000

will they get the bad guy repelling detonation of the movie

520

00:28:35,000 --> 00:28:37,000

back in the safety of the bunker

521

00:28:37,000 --> 00:28:40,000

at first things go just as planned

522

00:28:40,000 --> 00:28:43,000

did you leave a log burning on the kitchen table

523

00:28:43,000 --> 00:28:45,000

aww crap I did

524

00:28:46,000 --> 00:28:50,000

but in a dramatic turn of events after four minutes

525

00:28:51,000 --> 00:28:52,000

oh you know what's happening

526

00:28:52,000 --> 00:28:56,000

the gas is actually making the whole room catch on fire

527

00:28:57,000 --> 00:28:59,000

things suddenly get in sendery

528

00:28:59,000 --> 00:29:01,000

I see smoke on the

529

00:29:01,000 --> 00:29:03,000

oh sh** we're burning this building down

530

00:29:03,000 --> 00:29:05,000

and out of control

531

00:29:09,000 --> 00:29:11,000

there we go we had a blowout

532

00:29:11,000 --> 00:29:13,000

that's it

533

00:29:18,000 --> 00:29:21,000

well I don't know if we're putting this building down

534

00:29:22,000 --> 00:29:24,000

oh we should get up there with the house

535

00:29:24,000 --> 00:29:26,000

alright let's turn off the gas

536

00:29:26,000 --> 00:29:27,000

gas is off

537

00:29:27,000 --> 00:29:30,000

the mythbusters initiate the safety protocols

538

00:29:30,000 --> 00:29:33,000

and cautiously approach their apartment inferno

539

00:29:33,000 --> 00:29:34,000

don't go in

540

00:29:34,000 --> 00:29:36,000

I'm not seeing any flame

541

00:29:37,000 --> 00:29:38,000

there's the hole we blew

542

00:29:38,000 --> 00:29:41,000

it may not have been the blast of the movie

543

00:29:41,000 --> 00:29:42,000

it's a horch open there

544

00:29:42,000 --> 00:29:45,000

but the methane sure made a mess of the apartment

545

00:29:45,000 --> 00:29:48,000

so all of a sudden the fire is going up and reaching the ceiling

546

00:29:48,000 --> 00:29:50,000

there's smoke coming out of the top

547

00:29:50,000 --> 00:29:53,000

and then the mixture hit the bottom of the stoichiometric range

548

00:29:53,000 --> 00:29:54,000

and we saw this

549

00:29:54,000 --> 00:29:55,000

whooow

550

00:29:55,000 --> 00:29:57,000

across the whole room

551

00:29:58,000 --> 00:30:00,000

I'm seeing broken glass on a bunch of windows

552

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

on the back double doors

553

00:30:01,000 --> 00:30:04,000

it's clear that we got a significant reaction

554

00:30:04,000 --> 00:30:06,000

but nothing close to what we saw in the movie

555

00:30:07,000 --> 00:30:09,000

nothing close to a caboo

556

00:30:09,000 --> 00:30:11,000

but certainly enough of a conflagration

557

00:30:11,000 --> 00:30:13,000

to distract the bad guys

558

00:30:14,000 --> 00:30:17,000

it's really clear from all the melted plastic in there

559

00:30:17,000 --> 00:30:18,000

and even our exhaust fans melted

560

00:30:18,000 --> 00:30:21,000

it got super crazy hot in there

561

00:30:21,000 --> 00:30:22,000

very quickly

562

00:30:22,000 --> 00:30:24,000

I mean just the whole room was absolute

563

00:30:24,000 --> 00:30:26,000

I didn't even know what temperature it could be at

564

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

but it was really hot

565

00:30:27,000 --> 00:30:29,000

but you know we're not going to leave it there

566

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

no, no

567

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

next

568

00:30:34,000 --> 00:30:36,000

I think Carrie's going to scream her head off

569

00:30:36,000 --> 00:30:38,000

she may potentially pee her suit

570

00:30:38,000 --> 00:30:41,000

but I think that block of ice is going to land on the ground in one big chunk

571

00:30:46,000 --> 00:30:47,000

so here's where we're at

572

00:30:47,000 --> 00:30:49,000

we've looked into airline toilets

573

00:30:49,000 --> 00:30:51,000

and found that they can leak through an external fowl

574

00:30:51,000 --> 00:30:52,000

is it possible?

575

00:30:52,000 --> 00:30:53,000

absolutely

576

00:30:53,000 --> 00:30:54,000

we made our own fuselage

577

00:30:54,000 --> 00:30:56,000

went to NASA's wind tunnel

578

00:30:56,000 --> 00:30:59,000

and found that you could actually form a giant chunk of ice

579

00:30:59,000 --> 00:31:01,000

which then fell off the airplane

580

00:31:04,000 --> 00:31:08,000

now we're going to test what happens to that ice after it falls

581

00:31:08,000 --> 00:31:11,000

what we need to see for this myth to be confirmed

582

00:31:11,000 --> 00:31:14,000

is for that ice to fall through the air as one giant chuck

583

00:31:14,000 --> 00:31:18,000

and hit the ground as one piece with deadly force

584

00:31:19,000 --> 00:31:22,000

this is the final piece of the blue ice puzzle

585

00:31:22,000 --> 00:31:28,000

while falling from 12,000 feet at a terminal velocity of 160 miles per hour

586

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

will the ice stay in one piece

587

00:31:30,000 --> 00:31:36,000

or will wind erosion and warming temperatures cause it to break up into harmless blue rain

588

00:31:39,000 --> 00:31:42,000

to track that, the team has a spectacular plan of action

589

00:31:43,000 --> 00:31:47,000

we have our airplane, we're going to load it up with a large chunk of ice

590

00:31:47,000 --> 00:31:49,000

take it up to altitude and then throw it out

591

00:31:49,000 --> 00:31:52,000

now we're going to have a few skydivers jump out with the ice to track

592

00:31:52,000 --> 00:31:55,000

Kerry is going to be one of those skydivers

593

00:31:55,000 --> 00:32:00,000

yep, and skydiving team leader Nick also has the crucial job of timing the drop

594

00:32:00,000 --> 00:32:04,000

because if the myth is true and the blue ice falls in one chunk

595

00:32:04,000 --> 00:32:06,000

missing the mark could be deadly

596

00:32:06,000 --> 00:32:08,000

that's something you can see there

597

00:32:09,000 --> 00:32:10,000

okay so here's the plan

598

00:32:10,000 --> 00:32:13,000

Kerry and our expert Nick will go in the plane with the ice

599

00:32:13,000 --> 00:32:16,000

they're going to go up and based on the prevailing conditions

600

00:32:16,000 --> 00:32:19,000

and Nick's calculations they'll know when to release the ice

601

00:32:19,000 --> 00:32:22,000

at an altitude that they deem safe

602

00:32:22,000 --> 00:32:26,000

Nick will jump out and so will Kerry following the ice down

603

00:32:26,000 --> 00:32:28,000

do we fine

604

00:32:29,000 --> 00:32:30,000

I'm going to double check this

605

00:32:31,000 --> 00:32:35,000

meanwhile Tori and I will be on the ground tracking the ice in the air

606

00:32:35,000 --> 00:32:37,000

and looking for the impact zone

607

00:32:37,000 --> 00:32:39,000

and as for the blue ice

608

00:32:39,000 --> 00:32:43,000

well earlier Kerry prepared a similar size block to the test at NASA

609

00:32:43,000 --> 00:32:49,000

it's approximately the diameter of a basketball, eye catching and easily retrievable

610

00:32:49,000 --> 00:32:52,000

to make sure that we can watch this ice fall

611

00:32:52,000 --> 00:32:54,000

I've done something a little different

612

00:32:54,000 --> 00:32:58,000

I've made it red instead of blue so that it's going to stand out on the blue sky

613

00:32:58,000 --> 00:33:01,000

I've added some really long streamers so that we can track it

614

00:33:01,000 --> 00:33:03,000

and I'm going to put a GPS on it

615

00:33:04,000 --> 00:33:07,000

now for this myth to be confirmed we need to see that block of ice

616

00:33:07,000 --> 00:33:12,000

drop from altitude and get to the earth in one solid chunk

617

00:33:13,000 --> 00:33:15,000

good luck, good luck you guys

618

00:33:15,000 --> 00:33:17,000

what I think is going to happen

619

00:33:17,000 --> 00:33:19,000

I think Kerry is going to scream her head off

620

00:33:19,000 --> 00:33:21,000

she may potentially pee her suit

621

00:33:21,000 --> 00:33:25,000

but I think that block of ice is going to land on the ground in one big chunk

622

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

okay here's the package

623

00:33:27,000 --> 00:33:29,000

good luck

624

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

and despite all of their precautions they will need some luck

625

00:33:34,000 --> 00:33:38,000

their goal is to drop the ice and Kerry from 12,000 feet

626

00:33:38,000 --> 00:33:40,000

here we go Kerry

627

00:33:40,000 --> 00:33:45,000

the height at which Grant and Tori saw the ice release from the fuselage at NASA

628

00:33:45,000 --> 00:33:50,000

okay now I'm starting to get a little nervous

629

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

but will it remain intact

630

00:33:52,000 --> 00:33:56,000

traveling with an energy of 392,000 joules

631

00:33:56,000 --> 00:33:59,000

its impact will certainly be deadly

632

00:33:59,000 --> 00:34:05,000

however if it melts in the rising temperatures it'll be rendered harmless

633

00:34:06,000 --> 00:34:10,000

after the break the mythbusters touch down for blue ice

634

00:34:10,000 --> 00:34:13,000

wow nice

635

00:34:13,000 --> 00:34:16,000

and can Adam and Jamie get a big born move

636

00:34:23,000 --> 00:34:30,000

at 12,000 feet Kerry and her free falling friends are preparing to deploy their blue ice cargo

637

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

all I gotta do is look at the ice one job

638

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

but will it break up on descent

639

00:34:35,000 --> 00:34:39,000

or have the devastating impact internet reports claim

640

00:34:43,000 --> 00:34:47,000

if the team misjudged the timing of the drop by even a second

641

00:34:47,000 --> 00:34:54,000

a 35 pound projectile traveling at 160 miles per hour could crash through a neighboring house

642

00:34:55,000 --> 00:34:59,000

but that's only if the ice actually stays in one chunk

643

00:34:59,000 --> 00:35:03,000

if it breaks up the only thing busted will be the myth

644

00:35:05,000 --> 00:35:08,000

I've got them there approaching the drop zone

645

00:35:08,000 --> 00:35:13,000

so this is it it's time to drop out and jump off for science

646

00:35:18,000 --> 00:35:20,000

okay the ice is away

647

00:35:24,000 --> 00:35:26,000

ah what's over there

648

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

in a stunning piece of free fall camera work Nick manages to capture the ice as it plumps

649

00:35:37,000 --> 00:35:40,000

look how fast this falling is falling

650

00:35:40,000 --> 00:35:43,000

and Kerry can see that it's so far so good

651

00:35:43,000 --> 00:35:48,000

with the ice already at a balmy 5,000 feet it's still completely in jack

652

00:35:50,000 --> 00:35:54,000

look it's standing in one chunk dude that's crazy

653

00:35:54,000 --> 00:35:59,000

but will it stay that way as they enter the final few thousand feet of descent

654

00:35:59,000 --> 00:36:03,000

the TBI is right there and it's at near the target that's great

655

00:36:07,000 --> 00:36:09,000

wow

656

00:36:09,000 --> 00:36:11,000

do you see the size of that impact

657

00:36:11,000 --> 00:36:13,000

and did you see it stay in one chunk

658

00:36:13,000 --> 00:36:17,000

wow that's maybe only 150 feet from the drop zone

659

00:36:17,000 --> 00:36:21,000

I felt the ice going down which is weird exactly and it stayed intact

660

00:36:21,000 --> 00:36:23,000

let's go meet Kerry and we'll go find it

661

00:36:23,000 --> 00:36:25,000

alright let's go get him

662

00:36:25,000 --> 00:36:27,000

hi Kerry

663

00:36:27,000 --> 00:36:28,000

hi Grant

664

00:36:28,000 --> 00:36:29,000

here she goes

665

00:36:29,000 --> 00:36:31,000

she's coming in hot

666

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

you made it

667

00:36:33,000 --> 00:36:35,000

wow

668

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

nice

669

00:36:38,000 --> 00:36:41,000

what a ride and what a test

670

00:36:41,000 --> 00:36:44,000

and no wonder Kerry's adrenaline is off the charts

671

00:36:44,000 --> 00:36:46,000

let's go check out the ice did you see it

672

00:36:46,000 --> 00:36:48,000

yeah yeah I don't

673

00:36:48,000 --> 00:36:52,000

everything went according to plan for the majority of its descent

674

00:36:52,000 --> 00:36:57,000

there was visual contact confirming that the ice retained its shape and mass

675

00:36:57,000 --> 00:37:00,000

and then thanks to Kerry's visual aids

676

00:37:01,000 --> 00:37:06,000

and Nick's awesome aim finding the impact site is a breeze

677

00:37:06,000 --> 00:37:08,000

there's the streamer

678

00:37:08,000 --> 00:37:09,000

is it intact

679

00:37:09,000 --> 00:37:11,000

I mean it was a chunk before it hit the ground

680

00:37:11,000 --> 00:37:13,000

and that is still a chunk of ice

681

00:37:13,000 --> 00:37:17,000

check it out it dug itself into the ground

682

00:37:17,000 --> 00:37:19,000

that is a serious impact

683

00:37:19,000 --> 00:37:23,000

yep and it may have melted slightly in the time it took to find it

684

00:37:23,000 --> 00:37:27,000

but the crater created is a clear testament to its destructive power

685

00:37:28,000 --> 00:37:32,000

this is the size of the block of ice that we threw out of our plane

686

00:37:32,000 --> 00:37:37,000

which is very similar to the size of the chunk of ice that we formed in our wind tunnel at NASA

687

00:37:37,000 --> 00:37:38,000

that fell off

688

00:37:38,000 --> 00:37:42,000

that block of ice reached term of velocity very quickly

689

00:37:42,000 --> 00:37:44,000

it left a sizable impact crater

690

00:37:44,000 --> 00:37:49,000

what's more it stayed pretty much intact all the way down to impact

691

00:37:49,000 --> 00:37:53,000

okay a pilot can't release all of the toilet water once so that part's busted

692

00:37:53,000 --> 00:37:55,000

but I think the phenomena is confirmed

693

00:37:55,000 --> 00:37:57,000

I mean it made it all the way to the ground

694

00:37:57,000 --> 00:37:58,000

totally confirmed

695

00:37:58,000 --> 00:37:59,000

I agree 100%

696

00:37:59,000 --> 00:38:05,000

confirmed but three mechanical failures leading to blue ice falling on your house

697

00:38:05,000 --> 00:38:08,000

is in reality incredibly unlikely

698

00:38:09,000 --> 00:38:14,000

I don't want to be looking up for blue ice to fall in my head now right

699

00:38:14,000 --> 00:38:16,000

dude I'm gonna get blue ice insurance

700

00:38:16,000 --> 00:38:17,000

I know a guy

701

00:38:17,000 --> 00:38:18,000

yeah

702

00:38:18,000 --> 00:38:19,000

let me know I'll give you his number

703

00:38:25,000 --> 00:38:29,000

at the Mythbusters mansion they've been renovating foreign style

704

00:38:29,000 --> 00:38:30,000

don't move

705

00:38:30,000 --> 00:38:34,000

however the myth as it appears in the movie is busted

706

00:38:34,000 --> 00:38:35,000

uh oh

707

00:38:36,000 --> 00:38:40,000

but it ain't over until the man in the beret gets a big born boom

708

00:38:40,000 --> 00:38:44,000

so next they're upping the adi with more gas

709

00:38:44,000 --> 00:38:49,000

now when we empty this tank into that house that means that we'll have just over 9%

710

00:38:49,000 --> 00:38:51,000

methane to air in there

711

00:38:51,000 --> 00:38:54,000

and that happens to be the butter zone for an explosion

712

00:38:54,000 --> 00:38:59,000

the guys know from small scale that 9% netted them the most energetic boom

713

00:38:59,000 --> 00:39:01,000

but this is large scale

714

00:39:01,000 --> 00:39:05,000

will this test rip apart the apartment born style

715

00:39:05,000 --> 00:39:08,000

before they blow it up they need to spruce it up

716

00:39:08,000 --> 00:39:11,000

we've swapped out all the windows and doors

717

00:39:11,000 --> 00:39:14,000

all these holes that got warped and opened

718

00:39:14,000 --> 00:39:16,000

we're gonna actually lay in a bunch of stripping

719

00:39:16,000 --> 00:39:20,000

we probably tripled the cohesive strength of this building

720

00:39:20,000 --> 00:39:23,000

and that ought to give us just the boom we're looking for

721

00:39:24,000 --> 00:39:26,000

Jamie's known for how he handles his fans

722

00:39:27,000 --> 00:39:31,000

this time around I'm running the methane into the house through this hose

723

00:39:31,000 --> 00:39:35,000

that I've attached to the floor and I've drilled a lot of little holes in the hose

724

00:39:35,000 --> 00:39:42,000

so that we'll get these jets of gas coming out that will mix with the air that is being pushed across them with these fans

725

00:39:42,000 --> 00:39:44,000

kind of like a blender

726

00:39:44,000 --> 00:39:46,000

this mix the air all of

727

00:39:46,000 --> 00:39:47,000

yeah

728

00:39:47,000 --> 00:39:53,000

this swirling mass of air I'm hoping will distribute this fuel air mix throughout the room

729

00:39:53,000 --> 00:39:57,000

and hopefully that'll make the difference between a poof and a bang

730

00:39:57,000 --> 00:40:01,000

Jamie's fantastic method will circulate the methane throughout the apartment

731

00:40:01,000 --> 00:40:05,000

and with the dangerous ratio of 9% gas to air

732

00:40:05,000 --> 00:40:09,000

they'll need something more sophisticated for ignition

733

00:40:09,000 --> 00:40:12,000

we brought back out the neon transformer from the small scale testing

734

00:40:12,000 --> 00:40:14,000

with the addition of a little piece of paper here

735

00:40:14,000 --> 00:40:16,000

go ahead and plug it in

736

00:40:16,000 --> 00:40:20,000

we're gonna be able to set a fire exactly when we want to set a fire

737

00:40:20,000 --> 00:40:25,000

exactly when they achieve the Goldilocks ratio of 9% methane to air

738

00:40:25,000 --> 00:40:30,000

fans are rolling that's the last piece of the puzzle shall we get to a safe place and go boom

739

00:40:30,000 --> 00:40:32,000

yeah awesome

740

00:40:33,000 --> 00:40:35,000

let's turn on the gas

741

00:40:35,000 --> 00:40:36,000

okie dokie

742

00:40:36,000 --> 00:40:38,000

alright we got about five minutes let's get to the bunker

743

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

fire in the hole

744

00:40:43,000 --> 00:40:44,000

hopefully

745

00:40:44,000 --> 00:40:46,000

actually I think they need a new signal for us it'd be like

746

00:40:46,000 --> 00:40:48,000

fire in the hole

747

00:40:48,000 --> 00:40:49,000

hopefully

748

00:40:49,000 --> 00:40:55,000

hopefully is right the precise stoichiometric ratio should be enough to detonate their apartment

749

00:40:55,000 --> 00:40:59,000

so our fire starters take cover as the methane fills the room

750

00:40:59,000 --> 00:41:05,000

we're down below 20 cubic feet per minute and we're about 100 psi

751

00:41:05,000 --> 00:41:09,000

so I'm thinking we should go whenever you're ready

752

00:41:09,000 --> 00:41:16,000

with the room filled with 9% methane will this finally yield the Hollywood blowout

753

00:41:16,000 --> 00:41:23,000

alright here we go ideal gas air mixture born explosion in 3, 2, 1

754

00:41:24,000 --> 00:41:26,000

oh yeah

755

00:41:33,000 --> 00:41:35,000

that is awesome

756

00:41:35,000 --> 00:41:37,000

we blew out the whole front

757

00:41:37,000 --> 00:41:38,000

yeah

758

00:41:38,000 --> 00:41:40,000

we couldn't have done that if we planned

759

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

that was perfect

760

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

hahaha

761

00:41:42,000 --> 00:41:44,000

and there you have it

762

00:41:45,000 --> 00:41:49,000

one magnificent made to order apartment explosion

763

00:41:53,000 --> 00:41:58,000

but unlike the movie detonation this one is polite enough to put itself out

764

00:41:58,000 --> 00:42:00,000

well almost

765

00:42:00,000 --> 00:42:06,000

I hope this is a cautionary tale what happens when you mix mythbusters with science

766

00:42:06,000 --> 00:42:11,000

okay here's the thing while that was fairly exciting I mean we blew out the wall

767

00:42:11,000 --> 00:42:16,000

I want to point out that we didn't break any glass there was no bang it was a whoosh

768

00:42:16,000 --> 00:42:19,000

and that's something entirely different than what we saw in the movie

769

00:42:19,000 --> 00:42:26,000

the fact that this was an ideally mixed mixture with fans and everything in the exact quantity

770

00:42:26,000 --> 00:42:28,000

and that's the best we could do

771

00:42:28,000 --> 00:42:30,000

kind of like a real fire

772

00:42:30,000 --> 00:42:33,000

clearly we were born for this job

773

00:42:33,000 --> 00:42:37,000

haha yeah but it's kind of too bad that was a nice view in that house