

1

00:00:00,000 --> 00:00:07,000

Remember, do not try anything you are about to see at home.

2

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

We're not going to have to start drinking in the middle of the day again, are we?

3

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

Luckily, no. This is not a myth about getting drunk. It's a myth about what happens after you've already gotten drunk and gotten yourself into a bar fight.

4

00:00:46,000 --> 00:00:54,000

And the myth is that getting hit with an empty bottle is worse for you than getting hit with a bottle that's full. Allow me to demonstrate.

5

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

No silver screen bar fight scene is complete without one. However, unlike the movies, in real life, a bottle bash is extremely dangerous.

6

00:01:14,000 --> 00:01:26,000

How dangerous? Well, award-winning forensic scientists list skull fractures, concussions and scalp lacerations among the possible injuries.

7

00:01:26,000 --> 00:01:39,000

They also conclude that an empty bottle smash will do more damage. But is this really possible? Could a lighter, empty bottle really harm you more than a heavier, full one?

8

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

So how do you want to test this one?

9

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

Fake bottle, don't do this at home.

10

00:01:46,000 --> 00:01:49,000

Seriously, how are you thinking we should test this?

11

00:01:49,000 --> 00:01:52,000

Exactly like that, but with real bottles.

12

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

Except with head protection.

13

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

We'll have a closer look at what kind of forces are involved.

14

00:01:57,000 --> 00:01:58,000

Okay.

15

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

So, let the bar fight come in.

16

00:02:04,000 --> 00:02:11,000

Even though after a few beers it might seem like a good idea to hit somebody over the head with a beer bottle, it's probably not.

17

00:02:11,000 --> 00:02:18,000

Nevertheless, we feel inclined to get up close and personal on our testing, and that's where this comes in.

18

00:02:18,000 --> 00:02:30,000

This is a football helmet outfitted with a specially designed array of accelerometers that will register any movement of our skull and help us determine whether a full versus an empty beer bottle is more harmful.

19

00:02:30,000 --> 00:02:36,000

Plus, it's a nice excuse for me to hit Adam over the head with a bottle, which I regularly want to do.

20

00:02:37,000 --> 00:02:38,000

You ready?

21

00:02:38,000 --> 00:02:46,000

You know, before I put this on and take some hits to the head, let's put this on a non-human analog just to make sure it's safe, see what kind of forces are involved.

22

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

Okay.

23

00:02:51,000 --> 00:02:52,000

It's ready.

24

00:02:52,000 --> 00:02:53,000

I'm ready.

25

00:02:53,000 --> 00:02:54,000

We're ready.

26

00:02:54,000 --> 00:02:57,000

Okay, safety systems check.

27

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

Wow.

28

00:03:02,000 --> 00:03:05,000

That's not what happens in the movies.

29

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

Now, it seems like these are a lot harder to break than we thought.

30

00:03:10,000 --> 00:03:12,000

And I think that's because of a couple of vain reasons.

31

00:03:12,000 --> 00:03:15,000

What's the matter, old man? Been too long since your last bar fight?

32

00:03:15,000 --> 00:03:20,000

One is, in the movies, you're always seeing people smack each other over the head with bottles, and the bottles break really easily.

33

00:03:20,000 --> 00:03:22,000

Well, those are fake bottles.

34

00:03:22,000 --> 00:03:23,000

It's the movies.

35

00:03:23,000 --> 00:03:26,000

And number two, who among us hasn't dropped in broken bottles?

36

00:03:26,000 --> 00:03:28,000

They seem quite fragile.

37

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

But the fact is they're not.

38

00:03:29,000 --> 00:03:31,000

They're actually built to ship.

39

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

They're built to last.

40

00:03:32,000 --> 00:03:39,000

And when you look at shots like this, this, and this, it's pretty clear.

41

00:03:39,000 --> 00:03:41,000

These things are tougher than they look.

42

00:03:41,000 --> 00:03:44,000

Adam, however, is as tough as he looks.

43

00:03:44,000 --> 00:03:45,000

Ow, ow, ow.

44

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

Not very.

45

00:03:46,000 --> 00:03:48,000

So when our expert crunches the numbers...

46

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

That was about 107 Gs.

47

00:03:51,000 --> 00:03:54,000

The experiment takes a safer turn.

48

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

And about 100 Gs is the average concussion that we see in the field.

49

00:03:58,000 --> 00:04:01,000

I don't think I'm going to be wearing that helmet today.

50

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

I don't blame you.

51

00:04:02,000 --> 00:04:08,000

Clearly getting hit by one of these, even if you're wearing one of these, is a really nasty experience.

52

00:04:08,000 --> 00:04:14,000

So nasty, in fact, that we have decided we're not going to do any testing on human subjects today.

53

00:04:14,000 --> 00:04:17,000

Out goes the human, and off comes the helmet.

54

00:04:17,000 --> 00:04:26,000

The helmet, doing what it was designed to do, was flexing on impact, absorbing energy, and making it difficult to break the bottle.

55

00:04:26,000 --> 00:04:33,000

Q our hard-headed head stuntman with his crown of data collecting accelerometers.

56

00:04:36,000 --> 00:04:38,000

Well, there you go.

57

00:04:38,000 --> 00:04:39,000

Did you get a reading?

58

00:04:39,000 --> 00:04:41,000

Yeah, it's about 54 Gs.

59

00:04:41,000 --> 00:04:42,000

Awesome.

60

00:04:42,000 --> 00:04:43,000

Awesome.

61

00:04:43,000 --> 00:04:46,000

But one data point does not a sample make.

62

00:04:47,000 --> 00:04:50,000

So in a frenzy of beer and broken glass...

63

00:04:50,000 --> 00:04:51,000

33.

64

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

Hardman Heinemann smashes away.

65

00:04:55,000 --> 00:04:56,000

11 Gs.

66

00:04:56,000 --> 00:05:00,000

Until he's satisfied with a sample set of 7.

67

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

34.

68

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

Which yields an average of 28 Gs.

69

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

Awesome.

70

00:05:06,000 --> 00:05:08,000

Let's continue with an empty bottle.

71

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

Remember, the myth is that an empty bottle, when smashed, is more damaging than the full.

72

00:05:13,000 --> 00:05:14,000

Are you peeing?

73

00:05:14,000 --> 00:05:15,000

No.

74

00:05:15,000 --> 00:05:16,000

Okay.

75

00:05:16,000 --> 00:05:19,000

It's the comparison that's the key.

76

00:05:21,000 --> 00:05:22,000

Okay, here we go.

77

00:05:22,000 --> 00:05:23,000

Empty beer bottle.

78

00:05:25,000 --> 00:05:30,000

And as the numbers come in, it's clear that comparison does not favor the myth.

79

00:05:31,000 --> 00:05:32,000

13 Gs.

80

00:05:34,000 --> 00:05:35,000

So it's about 11 Gs.

81

00:05:36,000 --> 00:05:42,000

Less G force to the head from the empties appears to indicate they do less damage than the full ones.

82

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

But Adam's got an issue with the experimental design.

83

00:05:47,000 --> 00:05:52,000

In general, the data seems to support the idea that it's not looking very good for the myth.

84

00:05:52,000 --> 00:05:58,000

But we're seeing huge variances in the G-load on this guy, depending on how hard Jamie swings, which is very hard to control.

85

00:05:58,000 --> 00:06:07,000

Clearly moving forward, we're going to need to remove the variance of the human arm and go with a mechanical solution to solving this problem.

86

00:06:08,000 --> 00:06:19,000

Alright, Carrie, what do these things have in common?

87

00:06:19,000 --> 00:06:24,000

Okay, cream or cheese, leather, chicken, duct tape and a stale pipe.

88

00:06:24,000 --> 00:06:26,000

Saturday night at Adam Savage's house?

89

00:06:26,000 --> 00:06:27,000

Very close.

90

00:06:27,000 --> 00:06:28,000

No.

91

00:06:28,000 --> 00:06:30,000

Saturday night at Jamie Heineman's house?

92

00:06:30,000 --> 00:06:31,000

No, cannons.

93

00:06:31,000 --> 00:06:33,000

Okay, get everything but the leather.

94

00:06:33,000 --> 00:06:34,000

Well, that's the next myth.

95

00:06:34,000 --> 00:06:37,000

We are going to try to build a cannon out of nothing but leather.

96

00:06:37,000 --> 00:06:38,000

Okay, really?

97

00:06:38,000 --> 00:06:39,000

Absolutely.

98

00:06:39,000 --> 00:06:44,000

In the 17th century, King Gustavus Adolphus of Sweden came up with the idea.

99

00:06:44,000 --> 00:06:51,000

It was a copper core with iron bands reinforcing it, massive soap fabric, and finally the entire thing was wrapped in leather.

100

00:06:51,000 --> 00:06:53,000

That's not a leather cannon, that's a cannon covered in leather.

101

00:06:53,000 --> 00:06:54,000

But wait, there's more.

102

00:06:54,000 --> 00:07:00,000

Later that century, at the Siege of Balinalli Castle, Irish troops actually built a cannon using nothing but leather.

103

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

It was about five feet long and about five inches thick.

104

00:07:03,000 --> 00:07:05,000

Leather cannon, I like it.

105

00:07:06,000 --> 00:07:11,000

The mythbusters and cannons have a long and explosive history.

106

00:07:11,000 --> 00:07:14,000

I think we killed Captain Kirk.

107

00:07:14,000 --> 00:07:24,000

There was a cheese firing cannon, a cannon made from duct tape, and not to mention the famous cannon that fired chicken.

108

00:07:25,000 --> 00:07:29,000

So who better to get to the bottom of this mystery of history?

109

00:07:29,000 --> 00:07:36,000

Did the Swedes and Irish really make a viable and effective cannon from cow skin?

110

00:07:38,000 --> 00:07:40,000

So my leather man, what's the plan?

111

00:07:40,000 --> 00:07:44,000

Well, we definitely need to build both versions, Swedish and Irish.

112

00:07:44,000 --> 00:07:46,000

But before we do that, I think we need a benchmark.

113

00:07:46,000 --> 00:07:47,000

What do you mean?

114

00:07:47,000 --> 00:07:50,000

Well, we've built proof of concept cannons before, like the duct tape cannon.

115

00:07:50,000 --> 00:07:52,000

But those weren't weapons of war.

116

00:07:52,000 --> 00:07:54,000

We need something that can compete on the battlefield.

117

00:07:54,000 --> 00:07:57,000

So we need to compare it to a cast iron period cannon.

118

00:07:57,000 --> 00:07:58,000

Exactly.

119

00:07:58,000 --> 00:08:01,000

We'll find out how much black powder they use and how fast the projectiles come out.

120

00:08:01,000 --> 00:08:05,000

Yeah, and on those specs, we'll be able to judge how well our two cannons are doing.

121

00:08:05,000 --> 00:08:06,000

I like it.

122

00:08:07,000 --> 00:08:15,000

So first up, it's down to the bomb range to get the low down on period accurate hardware from period accurate experts.

123

00:08:16,000 --> 00:08:18,000

She is a beaut.

124

00:08:18,000 --> 00:08:19,000

Nice cannon.

125

00:08:19,000 --> 00:08:21,000

Yeah, you like her. This is Bonnie Blue.

126

00:08:21,000 --> 00:08:23,000

The Confederates tended to name their cannon.

127

00:08:23,000 --> 00:08:25,000

Yeah, we have a tendency to do that too.

128

00:08:25,000 --> 00:08:27,000

Let's get her off the truck and fire it up.

129

00:08:29,000 --> 00:08:32,000

You know it's go time when Grant's got his game face on.

130

00:08:33,000 --> 00:08:34,000

It's go time!

131

00:08:35,000 --> 00:08:42,000

So, we're going to fire this off, check the muzzle velocity and use that as a yard stick against the ones that we want to build.

132

00:08:42,000 --> 00:08:43,000

Look at that, perfect.

133

00:08:43,000 --> 00:08:46,000

If this doesn't stop the cannonball, I don't know what will.

134

00:08:46,000 --> 00:08:48,000

How about a stack of Union soldiers?

135

00:08:49,000 --> 00:08:53,000

Meanwhile, Grant is getting set up to measure what old Bonnie Blue can do.

136

00:08:53,000 --> 00:09:01,000

As you know, on our show, we love to use the high speed camera because it gives us all these juicy, gorgeous shots of things that happen in a blink of an eye.

137

00:09:06,000 --> 00:09:08,000

But today, it's going to be a scientific tool.

138

00:09:08,000 --> 00:09:10,000

Come on, let me show you.

139

00:09:12,000 --> 00:09:15,000

So we've aimed the high speed camera at this scale, which is set up next to the cannon.

140

00:09:15,000 --> 00:09:17,000

It has one foot increments.

141

00:09:17,000 --> 00:09:23,000

Given a known frame rate, we can count how many frames it takes for a cannonball to cross one of the increments.

142

00:09:23,000 --> 00:09:29,000

That would give us the cannonball's speed, which will form the benchmark for how well our Swedish and Irish cannons perform.

143

00:09:30,000 --> 00:09:32,000

Okay, let's talk black powder.

144

00:09:32,000 --> 00:09:35,000

Firing off the cheese cannon, maybe this much black powder.

145

00:09:38,000 --> 00:09:40,000

Ducktape cannon, maybe this much.

146

00:09:40,000 --> 00:09:41,000

Vent.

147

00:09:41,000 --> 00:09:45,000

And when we blew off Buster's leg, maybe that much.

148

00:09:47,000 --> 00:09:48,000

Vent.

149

00:09:48,000 --> 00:09:49,000

Vent.

150

00:09:49,000 --> 00:09:52,000

This is six ounces of black powder.

151

00:09:52,000 --> 00:09:54,000

That is what we'll be firing in our paired gun.

152

00:09:54,000 --> 00:09:56,000

Gun is loaded.

153

00:09:56,000 --> 00:09:59,000

Alright, muzzle velocity test, on your go.

154

00:09:59,000 --> 00:10:03,000

Three, two, one.

155

00:10:03,000 --> 00:10:05,000

Fire!

156

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

Good shot!

157

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

That thing's split it.

158

00:10:12,000 --> 00:10:14,000

Look at that!

159

00:10:14,000 --> 00:10:15,000

Bullseye!

160

00:10:15,000 --> 00:10:17,000

It is. Nice shot.

161

00:10:18,000 --> 00:10:21,000

So the whole point of today's experiment is not to find out whether that cannon fired.

162

00:10:21,000 --> 00:10:22,000

We know it does.

163

00:10:22,000 --> 00:10:23,000

Oh, there it is.

164

00:10:23,000 --> 00:10:27,000

Seven frames and a foot, that equals...

165

00:10:27,000 --> 00:10:36,000

The point is to find out how fast a real cannon could fire a cannonball the same size that the Swedish and Irish leather cannons were supposed to have fired.

166

00:10:36,000 --> 00:10:41,000

Okay, I believe we have 389 miles per hour.

167

00:10:41,000 --> 00:10:42,000

And we have that answer.

168

00:10:42,000 --> 00:10:44,000

389 miles per hour.

169

00:10:45,000 --> 00:10:47,000

So that's the benchmark.

170

00:10:47,000 --> 00:10:55,000

If the team can get their mythical leather cannon to fire that fast, there could be some fact to this historical fable.

171

00:10:56,000 --> 00:10:58,000

Next on Mythbusters.

172

00:10:59,000 --> 00:11:01,000

Adam packs up Porky Punch.

173

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

So where do we stand with the bottle bash?

174

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

Well, sadly we weren't able to bash each other over the heads with bottles.

175

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

We had to settle for this guy.

176

00:11:17,000 --> 00:11:19,000

And what did he have to tell us?

177

00:11:19,000 --> 00:11:24,000

Yes, that the full bottle somehow imparted more force than the empty bottle.

178

00:11:25,000 --> 00:11:27,000

Which contradicts the myth.

179

00:11:27,000 --> 00:11:30,000

Right, which is that somehow the empty bottle is worse for you.

180

00:11:30,000 --> 00:11:38,000

And given that I can't precisely control exactly how hard I hit, it's impossible to know whether it's the bottle or my hit that is causing a result.

181

00:11:38,000 --> 00:11:45,000

So what we need then is some kind of mechanical bottle bashing rig and a setup that helps us compare the injuries.

182

00:11:45,000 --> 00:11:47,000

It's like a bar fight robot.

183

00:11:47,000 --> 00:11:53,000

Okay, well you get started on that and I'll go talk to the neuro guy and see what kind of injuries we're looking for on heads.

184

00:11:53,000 --> 00:11:54,000

Okay.

185

00:11:56,000 --> 00:12:01,000

So while Adam builds a rig to bash brains with rigorous regularity,

186

00:12:03,000 --> 00:12:06,000

Jamie talks to a bashed brain expert.

187

00:12:06,000 --> 00:12:08,000

So what exactly happens in a concussion?

188

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

A concussion is when you transfer a force external through the skull to the brain.

189

00:12:13,000 --> 00:12:19,000

Think of the skull as a box and you've got the brain inside that has the consistency of Jello.

190

00:12:19,000 --> 00:12:21,000

This is your brain.

191

00:12:21,000 --> 00:12:24,000

I'm about to turn it into a Jello mold.

192

00:12:24,000 --> 00:12:25,000

Here we go.

193

00:12:26,000 --> 00:12:27,000

There we go.

194

00:12:27,000 --> 00:12:30,000

One gelatin brain mold.

195

00:12:30,000 --> 00:12:35,000

When a concussion occurs and force is delivered to the skull itself, the skull moves relative to the brain.

196

00:12:35,000 --> 00:12:38,000

The brain stays in one place and the skull moves against it.

197

00:12:38,000 --> 00:12:43,000

That can bruise the brain that's hitting the skull and it can actually damage the brain opposite that.

198

00:12:45,000 --> 00:12:47,000

Oh, what am I doing?

199

00:12:47,000 --> 00:12:49,000

I'm making gelatin brains.

200

00:12:49,000 --> 00:12:51,000

What are you doing?

201

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

It's all a function of force, Jamie.

202

00:12:53,000 --> 00:13:01,000

It's how much energy is transmitted to the skull and to the brain that determines how severe the concussion is or how much injury there is to the brain.

203

00:13:01,000 --> 00:13:03,000

There we go.

204

00:13:03,000 --> 00:13:05,000

That's what I'm thinking.

205

00:13:05,000 --> 00:13:12,000

It sounds like the bottom line is that whatever kind of blow moves the head more violently is what's going to cause more of a concussion.

206

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

Absolutely.

207

00:13:14,000 --> 00:13:24,000

The whole purpose of this rig is to precisely and at the same speed every time swing a beer bottle into our model head to see if we get a concussion or how bad a concussion we get.

208

00:13:24,000 --> 00:13:27,000

So first, the arm is held in tension by this spring.

209

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

The vice grip here holds onto the beer until it swings into the head.

210

00:13:31,000 --> 00:13:35,000

So we release the pin, the arm swings around all the way to the head.

211

00:13:35,000 --> 00:13:39,000

Here's the head on the neck weighing roughly about the same as a human head.

212

00:13:39,000 --> 00:13:40,000

Hold on.

213

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

Let me add the piece through his stones.

214

00:13:43,000 --> 00:13:45,000

A nice gelatin brain.

215

00:13:45,000 --> 00:13:47,000

Now we'll watch this on high speed.

216

00:13:47,000 --> 00:13:49,000

We'll see the brain bounce around.

217

00:13:49,000 --> 00:13:57,000

And if we can see a difference in how much the head moves and the brain bounces around, we might be able to tell something about the kind of concussion you'll get when someone breaks a bottle over your head.

218

00:14:03,000 --> 00:14:11,000

Carrie Grant and Tori are delving deep into ballistics history to uncover the mystery of two cannons made in a tannery.

219

00:14:13,000 --> 00:14:18,000

We're trying to replicate two historical cannons, both referred to as leather cannons.

220

00:14:18,000 --> 00:14:20,000

The first one is the Swedish cannon.

221

00:14:20,000 --> 00:14:26,000

It's got a copper core tube that's wrapped in some iron bands and some other stuff and basically has a leather veneer.

222

00:14:26,000 --> 00:14:28,000

The second cannon is the Irish cannon.

223

00:14:28,000 --> 00:14:30,000

This is from the early 1700s.

224

00:14:30,000 --> 00:14:33,000

Now this one is a more authentic leather cannon, if you ask me.

225

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

This one's entirely made out of leather.

226

00:14:36,000 --> 00:14:39,000

At least for the legs, is that what I'm looking at?

227

00:14:39,000 --> 00:14:41,000

Makes sense to me.

228

00:14:41,000 --> 00:14:42,000

You gotta bring something into battle?

229

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

Are you gonna carry a big steel cannon or a nice lightweight leather cannon?

230

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

You might see leather here, I see a cannon.

231

00:14:49,000 --> 00:14:51,000

Much more fashionable as well.

232

00:14:51,000 --> 00:14:57,000

With the hide soak to make it more malleable, it's time to focus on the first of the builds.

233

00:14:57,000 --> 00:14:59,000

Guess which one it is?

234

00:14:59,000 --> 00:15:03,000

The new dance is called Directing Traffic.

235

00:15:04,000 --> 00:15:10,000

So here's how you build an authentic 17th century all leather Irish cannon.

236

00:15:10,000 --> 00:15:11,000

Paint on the glue.

237

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

Insert a one inch thick plug at the back end.

238

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

Roll the hide around a steel fork.

239

00:15:18,000 --> 00:15:25,000

Hopefully this is gonna be strong enough to withstand exploding black powder.

240

00:15:25,000 --> 00:15:30,000

Lemonate enough layers to ensure a one inch thick barrel with a five inch diameter.

241

00:15:30,000 --> 00:15:35,000

Is it just me or does our badass cannon look more like a hot dog?

242

00:15:35,000 --> 00:15:37,000

Tie it off and wait for it to dry.

243

00:15:37,000 --> 00:15:40,000

It's not the prettiest thing, but I think it'll work.

244

00:15:40,000 --> 00:15:43,000

That's what they said when they hired me.

245

00:15:44,000 --> 00:15:49,000

Now in the 1600s in Europe, everybody had pretty much the same design for cannons.

246

00:15:49,000 --> 00:15:51,000

Giant cast iron.

247

00:15:51,000 --> 00:15:55,000

Unfortunately, these cannons were incredibly heavy and cumbersome,

248

00:15:55,000 --> 00:16:00,000

and it took several men and several horses just to move them into position.

249

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

Long came the King of Sweden, King Gustavus Adolphus II,

250

00:16:04,000 --> 00:16:06,000

who had a brand new idea for an army.

251

00:16:06,000 --> 00:16:09,000

An army that was incredibly mobile that could deploy quickly.

252

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

He threw out this idea of a cannon and came up with something that was lighter and more portable.

253

00:16:17,000 --> 00:16:20,000

Now in truth, there wasn't much leather in a Swedish leather cannon.

254

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

In fact, it had a thin walled copper tube for its barrel.

255

00:16:24,000 --> 00:16:29,000

Its basic sawed off leather cannon with a brass plug on the end.

256

00:16:30,000 --> 00:16:34,000

That was covered with several layers of canvas soaked in mastic.

257

00:16:34,000 --> 00:16:37,000

What the heck is mastic? Well, it's a type of resin.

258

00:16:37,000 --> 00:16:42,000

Now we don't have mastic, but what we do have is a two-part epoxy resin.

259

00:16:42,000 --> 00:16:45,000

On top of that, we're four iron bands to reinforce it.

260

00:16:45,000 --> 00:16:47,000

Then more canvas and mastic.

261

00:16:47,000 --> 00:16:50,000

Then paint another layer. That way it gets embedded.

262

00:16:50,000 --> 00:16:52,000

When it hardens, it's going to be very strong.

263

00:16:52,000 --> 00:16:55,000

And finally, on the top was leather.

264

00:16:55,000 --> 00:16:58,000

Now it was called a leather cannon, but in fact it was a hybrid.

265

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

It had a metal barrel.

266

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

The important thing is that it was lightweight and mobile.

267

00:17:04,000 --> 00:17:05,000

Mobile, you say?

268

00:17:05,000 --> 00:17:08,000

Well, with these wheels, they can roll on down to the bomb range.

269

00:17:08,000 --> 00:17:09,000

Charge!

270

00:17:10,000 --> 00:17:15,000

Where we'll find out whether these mythical cannons built to spec could have really worked.

271

00:17:16,000 --> 00:17:21,000

After the break, Jellohead is left dazed, confused and lobotomized.

272

00:17:21,000 --> 00:17:23,000

It's a delicious memory.

273

00:17:26,000 --> 00:17:31,000

It's a counter-intuitive conundrum.

274

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

Forensic scientists tell us an empty beer bottle broken on your brain box

275

00:17:36,000 --> 00:17:40,000

will cause more damage than a heavier full one.

276

00:17:43,000 --> 00:17:49,000

Looking for answers, Jamie and Adam are lining up Jellohead for a comparative concussion test.

277

00:17:50,000 --> 00:17:54,000

Do I have a prediction about whether the full bottle or the empty bottle is going to be worse

278

00:17:54,000 --> 00:17:55,000

in terms of our concussion test?

279

00:17:55,000 --> 00:17:56,000

I do.

280

00:17:56,000 --> 00:17:57,000

I'm going to vote for the full bottle.

281

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

And the reason is there's more mass in the full bottle.

282

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

And I have to imagine the mass of the liquid behind the glass has to matter in the equation,

283

00:18:04,000 --> 00:18:06,000

especially when it comes to moving a head around.

284

00:18:06,000 --> 00:18:08,000

I think it's going to be the full one.

285

00:18:08,000 --> 00:18:09,000

Alright, I'm ready if you're ready.

286

00:18:09,000 --> 00:18:10,000

I'm ready.

287

00:18:10,000 --> 00:18:11,000

Okay, here we go.

288

00:18:11,000 --> 00:18:14,000

One full beer bottle concussion test.

289

00:18:14,000 --> 00:18:17,000

In three, two, one.

290

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

Good.

291

00:18:23,000 --> 00:18:24,000

It looks great.

292

00:18:25,000 --> 00:18:26,000

Seems to work.

293

00:18:26,000 --> 00:18:28,000

Except it doesn't.

294

00:18:28,000 --> 00:18:30,000

I look at the high speed.

295

00:18:30,000 --> 00:18:31,000

Wow.

296

00:18:31,000 --> 00:18:34,000

Confirms the beer isn't clear.

297

00:18:34,000 --> 00:18:38,000

Problem is the beer is obstructing our ability to see the brain.

298

00:18:38,000 --> 00:18:40,000

Isn't that always the way?

299

00:18:42,000 --> 00:18:46,000

So the way to go is carbonated H<sub>2</sub>O.

300

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

We're ready.

301

00:18:47,000 --> 00:18:48,000

Let's do it.

302

00:18:48,000 --> 00:18:50,000

Full beer bottle concussion test.

303

00:18:50,000 --> 00:18:53,000

Three, two, one.

304

00:18:57,000 --> 00:18:58,000

Didn't break.

305

00:18:58,000 --> 00:18:59,000

High speed.

306

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

High speed.

307

00:19:04,000 --> 00:19:05,000

Wow.

308

00:19:05,000 --> 00:19:08,000

That's a lot of force.

309

00:19:08,000 --> 00:19:12,000

You see how the skull moves and then the brain's in one place.

310

00:19:12,000 --> 00:19:13,000

Yeah.

311

00:19:13,000 --> 00:19:16,000

The skull is on the left side of the skull, on the front side.

312

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

And then look at that, the brain's going completely to the opposite.

313

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

Oh, wow.

314

00:19:20,000 --> 00:19:22,000

Look at the waves inside the jello.

315

00:19:22,000 --> 00:19:25,000

That's what happens in real life.

316

00:19:27,000 --> 00:19:28,000

Good Lord.

317

00:19:28,000 --> 00:19:31,000

Never leave the house without a helmet, huh?

318

00:19:31,000 --> 00:19:32,000

No kidding.

319

00:19:33,000 --> 00:19:37,000

The full bottle hit clearly falls into the not good category.

320

00:19:37,000 --> 00:19:38,000

Another waste of beer.

321

00:19:38,000 --> 00:19:41,000

Cue the empty bottle comparison.

322

00:19:41,000 --> 00:19:43,000

Nowhere kittens are crying.

323

00:19:45,000 --> 00:19:47,000

What do you think's going to happen, buddy?

324

00:19:52,000 --> 00:19:53,000

Really?

325

00:19:55,000 --> 00:19:57,000

No, I never saw it that way before.

326

00:19:59,000 --> 00:20:00,000

Okay.

327

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

You ready for the empty bottle?

328

00:20:01,000 --> 00:20:02,000

Ready.

329

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

Is this the point we make the joke about?

330

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

I'd rather have a bottle in front of me than a frontal lobotomy.

331

00:20:07,000 --> 00:20:08,000

That works.

332

00:20:08,000 --> 00:20:09,000

All right.

333

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

Empty bottle concussion test.

334

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

Three, two, one.

335

00:20:17,000 --> 00:20:19,000

I don't even need to see the high speed.

336

00:20:19,000 --> 00:20:22,000

I can tell by looking at the guy's face that he's messed up.

337

00:20:22,000 --> 00:20:28,000

Sure, he's not a pretty sight, but he's actually a lot better off than he was after the last test.

338

00:20:28,000 --> 00:20:33,000

The lateral movement of the skull is significantly reduced with the empty bottle.

339

00:20:33,000 --> 00:20:37,000

Boy, there's nowhere near the amount of head movement relative to brain.

340

00:20:37,000 --> 00:20:41,000

So it is moving around, but not near as much as it was with the full bottle.

341

00:20:41,000 --> 00:20:42,000

Yeah.

342

00:20:42,000 --> 00:20:45,000

Yeah, delivering less force with the empty bottle.

343

00:20:45,000 --> 00:20:46,000

No question.

344

00:20:46,000 --> 00:20:47,000

Awesome.

345

00:20:47,000 --> 00:20:49,000

That's like a result.

346

00:20:49,000 --> 00:20:51,000

Let's put the two up next to each other on the screen.

347

00:20:51,000 --> 00:20:52,000

Just like that.

348

00:20:52,000 --> 00:20:53,000

Okay, now play.

349

00:20:54,000 --> 00:20:55,000

Look at that.

350

00:20:55,000 --> 00:20:56,000

It couldn't be clearer.

351

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

The full bottle is far worse.

352

00:20:59,000 --> 00:21:03,000

That's another headache for this forensic science-inspired myth.

353

00:21:03,000 --> 00:21:11,000

So far, Adam and Jamie have yet to see a sign that an empty bottle, when smashed, can cause more damage.

354

00:21:11,000 --> 00:21:13,000

But they're not done yet.

355

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

The additional mass in a full bottle does seem to impart more energy to a target skull when it's broken over it.

356

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

And that could lead to a concussion.

357

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

But we're talking about head injury here.

358

00:21:24,000 --> 00:21:26,000

And so that could also be skull fractures.

359

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

It could be skin lacerations.

360

00:21:28,000 --> 00:21:31,000

So we're going to have a close look at those two.

361

00:21:31,000 --> 00:21:36,000

Buddy, remember that time I built the machine to swing bottles of beer at your head?

362

00:21:39,000 --> 00:21:40,000

No, you don't.

363

00:21:41,000 --> 00:21:43,000

It's a delicious memory.

364

00:21:44,000 --> 00:21:49,000

Coming up on Mythbusters, can you really build a leather cannon that works?

365

00:21:55,000 --> 00:21:56,000

Alright, so here's where we're at.

366

00:21:56,000 --> 00:21:59,000

So far, we've tested out the Parrot Rifle.

367

00:22:01,000 --> 00:22:03,000

Which is an all-metal barrel cannon.

368

00:22:07,000 --> 00:22:09,000

We found out how fast that can fire a cannonball.

369

00:22:09,000 --> 00:22:12,000

389 miles per hour.

370

00:22:12,000 --> 00:22:13,000

Wow.

371

00:22:13,000 --> 00:22:21,000

Now what we're going to do is test out the Swedish leather cannon, in which most of the metal of the barrel has been replaced by other materials to make it lighter.

372

00:22:21,000 --> 00:22:23,000

Woohoo! Let's go to battle!

373

00:22:23,000 --> 00:22:29,000

Then we'll move on to the Irish leather cannon, in which it's all leather. No metal whatsoever.

374

00:22:29,000 --> 00:22:32,000

That's the one problem with putting water in the barrels. It's a little messy.

375

00:22:32,000 --> 00:22:34,000

Then we could do some mud wrestling later.

376

00:22:36,000 --> 00:22:37,000

On a pie.

377

00:22:39,000 --> 00:22:50,000

So, using the muzzle velocity of the Parrot Rifle as a benchmark, the team are about to find out whether the mythical leather cannons were the real deal or a hide-hooks.

378

00:22:50,000 --> 00:22:52,000

It's the Swedish mud dance.

379

00:22:52,000 --> 00:22:54,000

Lipsen, da hend, do i shen.

380

00:22:54,000 --> 00:23:00,000

And with the remote control ignition in place, the boys bring in the boom-making black powder.

381

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

Alright folks, what I have here is six ounces of black powder. This is what we're going to be using to propel our cannonball.

382

00:23:07,000 --> 00:23:12,000

Now when we fired the Parrot Gun, it was traveling at 389 miles per hour. That is fast.

383

00:23:12,000 --> 00:23:17,000

The same amount of energy it would be like hitting a baseball going 1200 miles per hour.

384

00:23:17,000 --> 00:23:20,000

Folks, this is something you do not want to play with.

385

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

However, we're about to know.

386

00:23:22,000 --> 00:23:26,000

Alright, who ordered the Super Burrito with extra gun powder?

387

00:23:26,000 --> 00:23:27,000

Gimme that.

388

00:23:27,000 --> 00:23:33,000

So with a firm grip on the explosive potential involved and all of the technical jargon.

389

00:23:33,000 --> 00:23:34,000

Okay, where's the pokey stick?

390

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

The team lock and load.

391

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

Venting.

392

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

Alright, loaded.

393

00:23:40,000 --> 00:23:42,000

It's pretty hard to predict what's going to happen here.

394

00:23:42,000 --> 00:23:44,000

Okay, I can feel that in the powder.

395

00:23:44,000 --> 00:23:47,000

I think that we might have a pipe bomb.

396

00:23:47,000 --> 00:23:51,000

This is very exciting. We have our Swedish cannon built and we are about to test it.

397

00:23:51,000 --> 00:23:55,000

Now we made it as period accurate as we possibly could.

398

00:23:55,000 --> 00:23:57,000

Looking through all the books and history on how they built it.

399

00:23:57,000 --> 00:24:00,000

Now it's time to test whether or not this is going to work.

400

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

We think about that aim.

401

00:24:01,000 --> 00:24:03,000

I think it looks pretty good.

402

00:24:03,000 --> 00:24:04,000

Is it going to fire the cannonball?

403

00:24:04,000 --> 00:24:06,000

I don't know. If it does work, how cool is that?

404

00:24:06,000 --> 00:24:10,000

If it doesn't, it just explodes. That's pretty cool too.

405

00:24:10,000 --> 00:24:11,000

Okay, I'm going to go hunt.

406

00:24:11,000 --> 00:24:12,000

You ready?

407

00:24:12,000 --> 00:24:13,000

I'm ready.

408

00:24:13,000 --> 00:24:15,000

Fire in the hole!

409

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

This is Swedish cannon in three, two, one.

410

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

Yeah!

411

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

Yeah!

412

00:24:25,000 --> 00:24:26,000

Look at that.

413

00:24:26,000 --> 00:24:27,000

It worked?

414

00:24:28,000 --> 00:24:29,000

Or did it?

415

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

Now we came out here, some of us thought that this was going to shoot off like a cannon.

416

00:24:34,000 --> 00:24:36,000

Some of us thought it might explode.

417

00:24:36,000 --> 00:24:37,000

Pretty much did both.

418

00:24:39,000 --> 00:24:40,000

Oh crap.

419

00:24:40,000 --> 00:24:46,000

Look at this. It just completely blew out the back end.

420

00:24:46,000 --> 00:24:50,000

Well, one shot wonder.

421

00:24:50,000 --> 00:24:55,000

We actually had the cannonball shoot out of one end while the in bits shot out the other.

422

00:24:56,000 --> 00:24:58,000

Yeah, it's not looking too good.

423

00:24:59,000 --> 00:25:03,000

But a quick assessment of the targets and the team are much more positive.

424

00:25:03,000 --> 00:25:05,000

Hey, it did the job.

425

00:25:05,000 --> 00:25:07,000

Come on, give it up for the Swedish cannon.

426

00:25:07,000 --> 00:25:10,000

It did make it through the sandbags, but it did make it through the second barrel.

427

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

And once the numbers are crunched, it gets even more interesting.

428

00:25:14,000 --> 00:25:20,000

So we tested our Swedish cannon, the same size and weight cannonball, the same amount of black powder.

429

00:25:20,000 --> 00:25:24,000

Okay, so that's three frames at 2,000 frames per second, right?

430

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

Mm-hmm.

431

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

All right, that is crazy, but I am getting 667 feet per second, which is over 450 miles an hour.

432

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

That's 50 miles an hour faster than our parrot gun.

433

00:25:37,000 --> 00:25:38,000

What?

434

00:25:38,000 --> 00:25:45,000

I've got to say, its performance was equal to, or a little bit better than the all-metal cannon.

435

00:25:45,000 --> 00:25:47,000

It had a muzzle velocity that was higher.

436

00:25:47,000 --> 00:25:51,000

Maybe it was a tighter pack, so that way it shot the ball faster. Who knows?

437

00:25:51,000 --> 00:25:54,000

We only missed the X-byte that much.

438

00:25:54,000 --> 00:26:01,000

Minor problem. We blew out the breach, but bear in mind, this was our first attempt to make this type of cannon.

439

00:26:01,000 --> 00:26:04,000

I'm sure the Swedish didn't get right the first time.

440

00:26:04,000 --> 00:26:10,000

So as far as a battlefield weapon, the Swedish cannon had superior maneuverability with very good accuracy.

441

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

Unfortunately, longevity could be a problem.

442

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

And as it turns out historically, it was.

443

00:26:16,000 --> 00:26:23,000

So in the context of the parrot rifle performance benchmark, the lightweight hybrid cannon matched up.

444

00:26:23,000 --> 00:26:27,000

Which just leaves the Irish questioned.

445

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

Wheels came off. Good sign.

446

00:26:29,000 --> 00:26:31,000

I know what you're thinking.

447

00:26:31,000 --> 00:26:36,000

It looks like a giant hot dog on wheels, but it is in fact our Irish leather cannon.

448

00:26:36,000 --> 00:26:39,000

And we built it exactly the way our research said.

449

00:26:39,000 --> 00:26:42,000

One inch thick barrel, nothing but leather.

450

00:26:42,000 --> 00:26:43,000

I think it could work.

451

00:26:43,000 --> 00:26:44,000

It's only when you like it.

452

00:26:44,000 --> 00:26:45,000

Pretty good right there, yeah.

453

00:26:45,000 --> 00:26:51,000

Now it's time to load it up, fire it off, and see if it does in fact shoot like a cannon.

454

00:26:51,000 --> 00:26:52,000

This is going to be funny.

455

00:26:52,000 --> 00:26:54,000

So we've got six ounces of black powder.

456

00:26:54,000 --> 00:26:55,000

All right, ready to load?

457

00:26:55,000 --> 00:26:56,000

Black powder.

458

00:26:56,000 --> 00:26:58,000

A three pound cannonball.

459

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

Oh, that's nice and tight.

460

00:26:59,000 --> 00:27:02,000

And a barrel that's one inch thick of leather.

461

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

You add all that up.

462

00:27:03,000 --> 00:27:05,000

I think you're going to get boom.

463

00:27:05,000 --> 00:27:08,000

Two, one.

464

00:27:08,000 --> 00:27:10,000

Whoa.

465

00:27:10,000 --> 00:27:12,000

Whoa.

466

00:27:12,000 --> 00:27:14,000

Nice.

467

00:27:14,000 --> 00:27:17,000

Look what happened.

468

00:27:17,000 --> 00:27:19,000

Look what the cannonball is.

469

00:27:19,000 --> 00:27:21,000

It's like two feet.

470

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

It was more dangerous to be behind this cannon than in front of the cannon.

471

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

Yep, it's pretty clear the Irish cannon failed on all counts.

472

00:27:32,000 --> 00:27:40,000

The back end blew out, and even with modern glue, the barrel unraveled so the guys can't even try again.

473

00:27:40,000 --> 00:27:42,000

Technically this is a cannon.

474

00:27:42,000 --> 00:27:45,000

We managed to launch the ball out of the barrel.

475

00:27:45,000 --> 00:27:48,000

However, it only went four feet and we blew the back end out of it.

476

00:27:48,000 --> 00:27:50,000

So it's not a very effective cannon.

477

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

And what we were looking for for this myth to be confirmed is very simple.

478

00:27:54,000 --> 00:27:55,000

Lethality.

479

00:27:55,000 --> 00:27:57,000

Say the Irish were fighting leprechauns.

480

00:27:57,000 --> 00:27:59,000

It might be lethal.

481

00:27:59,000 --> 00:28:01,000

Look at how far the cannonball went.

482

00:28:01,000 --> 00:28:11,000

We tested the Parrot Rifle and the Swedish Leather Cannon, and with the same size cannonball and same amount of gunpowder, they were able to launch the ball at 350 to 450 miles per hour.

483

00:28:11,000 --> 00:28:15,000

Now as far as the Irish Leather Cannon goes, I can't call that lethal.

484

00:28:15,000 --> 00:28:16,000

No.

485

00:28:16,000 --> 00:28:21,000

With the best available information built to those specifications, this one is busted.

486

00:28:21,000 --> 00:28:23,000

But that does not mean we're going to end here.

487

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

We are going to see what it would take to build a working cannon out of nothing but leather.

488

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

It might not be possible, but we're going to try.

489

00:28:31,000 --> 00:28:37,000

Coming up, Jamie brings Meathead to life before bashing his brain box with a beer bottle.

490

00:28:37,000 --> 00:28:42,000

What?

491

00:28:42,000 --> 00:28:53,000

Adam and Jamie have already seen that as far as concussions go, contrary to the myth, a full bottle smash is worse for you than an empty.

492

00:28:53,000 --> 00:29:00,000

The brain itself was displaced much more with a full bottle as compared to the empty bottle.

493

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

But what about other types of head trauma?

494

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

What about a skull fracture?

495

00:29:05,000 --> 00:29:07,000

To find out, Jamie...

496

00:29:07,000 --> 00:29:09,000

That's what I'm talking about.

497

00:29:09,000 --> 00:29:12,000

...is taking a piece of pig skull...

498

00:29:12,000 --> 00:29:15,000

Seven millimeters. Same thickness as a human skull.

499

00:29:15,000 --> 00:29:24,000

...to calibrate and manufacture a polyurethane plastic that fractures in exactly the same way as a human skull.

500

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

Pulled from the pan while pliable, he forms it into shape before it hardens.

501

00:29:30,000 --> 00:29:34,000

We've got the base and we've got this insert that goes over this cavity.

502

00:29:34,000 --> 00:29:42,000

And when we hit it with a beer bottle like so, if we get a fracture, we know that we would have fractured a real skull.

503

00:29:42,000 --> 00:29:47,000

To get a realistic mass, Jamie adds a brain's weight of ground beef.

504

00:29:47,000 --> 00:29:49,000

That's it. Six pounds.

505

00:29:49,000 --> 00:29:53,000

Meanwhile, Adam has built a bar for the soon-to-breakout bar fight.

506

00:29:53,000 --> 00:29:55,000

Welcome to the Mythbusters bar.

507

00:29:55,000 --> 00:29:58,000

Can I interest you in an empty beer?

508

00:29:59,000 --> 00:30:05,000

Which means Meathead, with his inability to duck, is about to get a headache.

509

00:30:05,000 --> 00:30:09,000

Mr. Heineman says it's time to bash some heads in and chew some gum.

510

00:30:09,000 --> 00:30:12,000

And he's fresh out of gum. Take it away.

511

00:30:12,000 --> 00:30:18,000

Okay, skull fracture rig. And three, two, one.

512

00:30:21,000 --> 00:30:23,000

Oh, hell broke loose.

513

00:30:23,000 --> 00:30:31,000

We got broken bottles, we got broken head, meat spilling out all over the place.

514

00:30:31,000 --> 00:30:38,000

Adam's no doctor, but broken head and meat spilling out is a fairly accurate diagnosis.

515

00:30:38,000 --> 00:30:44,000

Oh, man, that is, it's clearly shattered the skull.

516

00:30:44,000 --> 00:30:46,000

Totally shattered the skull, the rig worked.

517

00:30:46,000 --> 00:30:48,000

Yep, Meathead did us proud, huh?

518

00:30:48,000 --> 00:30:51,000

All we need now is to try this with an empty bottle.

519

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

Yep.

520

00:30:52,000 --> 00:30:54,000

More data.

521

00:30:54,000 --> 00:31:01,000

More data with a side of sampling and a comparative observation salad coming right up.

522

00:31:01,000 --> 00:31:04,000

Empty bottle of beer coming right up.

523

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

Buddy, we're going to do this at least one more time, and if it's any consolation,

524

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

it's going to hurt you a lot more than it's going to hurt me.

525

00:31:11,000 --> 00:31:13,000

When you're ready.

526

00:31:13,000 --> 00:31:15,000

Empty bottle into skull fracture rig.

527

00:31:15,000 --> 00:31:18,000

Three, two, one.

528

00:31:19,000 --> 00:31:21,000

That's what I'm talking about.

529

00:31:21,000 --> 00:31:22,000

One.

530

00:31:24,000 --> 00:31:26,000

Now you broke it.

531

00:31:26,000 --> 00:31:28,000

That's why we can't have nice things.

532

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

No, it's fracture.

533

00:31:30,000 --> 00:31:32,000

No fracture on the skull.

534

00:31:32,000 --> 00:31:38,000

The whole purpose of this experiment is to figure out if it's worse to get a full bottle broken over your head

535

00:31:38,000 --> 00:31:40,000

or an empty bottle broken over your head.

536

00:31:40,000 --> 00:31:42,000

Personally, I want neither.

537

00:31:42,000 --> 00:31:47,000

But if I had to choose, especially when it comes to skull fractures like this test here,

538

00:31:47,000 --> 00:31:51,000

the full bottle delivers more damaging skull fracturing force in the empty bottle.

539

00:31:51,000 --> 00:32:00,000

But we're not done for upon close examination, Jamie and I know many lacerations in the skull of this meat head.

540

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

And we wonder perhaps in the area of lacerations, an empty bottle might be worse than a full bottle.

541

00:32:07,000 --> 00:32:08,000

We don't know.

542

00:32:08,000 --> 00:32:13,000

So we're going to stretch some skin over one of these heads and start hitting that with broken bottles.

543

00:32:13,000 --> 00:32:14,000

Yeah.

544

00:32:15,000 --> 00:32:16,000

Three.

545

00:32:16,000 --> 00:32:22,000

Down at the bomb range, the myth of the Irish all-leather cannon took a hiding.

546

00:32:22,000 --> 00:32:24,000

I just can't call that lethal.

547

00:32:24,000 --> 00:32:26,000

No, I mean that's pathetic.

548

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

But our team of tanners aren't done yet.

549

00:32:30,000 --> 00:32:37,000

They've set themselves the challenge of building an effective, viable cannon from nothing but cow-high.

550

00:32:37,000 --> 00:32:39,000

You have to massage the leather.

551

00:32:39,000 --> 00:32:41,000

You make it very supple.

552

00:32:41,000 --> 00:32:42,000

It makes it better cannon.

553

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

So just like everything else on this cannon, we're beefing it up, so to speak.

554

00:32:46,000 --> 00:32:51,000

This is our super breech plug, made out of 42 layers of leather.

555

00:32:51,000 --> 00:32:53,000

This is going to get rolled into the cannon.

556

00:32:53,000 --> 00:32:59,000

The charge goes here, cannonball goes here, and when we set it off, hopefully it goes like, baboom.

557

00:32:59,000 --> 00:33:01,000

And not like, baboing.

558

00:33:03,000 --> 00:33:05,000

Now I'm working on the breech section.

559

00:33:05,000 --> 00:33:09,000

What I have done is take the same cow-high, cut it down to two-inch wide strips.

560

00:33:09,000 --> 00:33:15,000

I'm putting on the contact cement on both sides, and then I'm laying those strips length-wise around the back end of the cannon.

561

00:33:15,000 --> 00:33:18,000

This is going to strengthen up our breech area.

562

00:33:18,000 --> 00:33:24,000

So that way it is strong enough to withstand the explosion of black powder in order to get our cannonball to launch.

563

00:33:24,000 --> 00:33:26,000

It's like whack-a-mole, isn't it?

564

00:33:26,000 --> 00:33:28,000

Get your frustrations out on this thing, right?

565

00:33:29,000 --> 00:33:37,000

With the back end sufficiently built up, glued, and beaten into submission, the team is optimistic about their chances of success.

566

00:33:37,000 --> 00:33:41,000

This is the blast chamber. We're talking about a 12-inch diameter.

567

00:33:41,000 --> 00:33:47,000

Not only that, but the breech has been reinforced with so many straps that we have about that much holding up the back end.

568

00:33:47,000 --> 00:33:53,000

I think there might be a possibility that we've made ourselves a working leather cannon.

569

00:33:53,000 --> 00:33:56,000

Now, I have a few finishing touches.

570

00:33:56,000 --> 00:33:59,000

Just, you know, give it a little bit of beauty.

571

00:33:59,000 --> 00:34:06,000

So under a veil of secrecy, our material girl applies her fashionable finishing touches.

572

00:34:07,000 --> 00:34:11,000

Then it's back down to the bomb range. Drum roll, please.

573

00:34:13,000 --> 00:34:14,000

For the big reveal.

574

00:34:14,000 --> 00:34:18,000

I was getting bored with the plain old leather cannon since we did so many.

575

00:34:18,000 --> 00:34:19,000

I thought, why not?

576

00:34:21,000 --> 00:34:22,000

Jazz it up a little bit.

577

00:34:22,000 --> 00:34:23,000

It's a designer cannon.

578

00:34:23,000 --> 00:34:24,000

Wow.

579

00:34:24,000 --> 00:34:25,000

That's crazy.

580

00:34:25,000 --> 00:34:28,000

That is funny. You just pimp this cannon out.

581

00:34:28,000 --> 00:34:30,000

It's worth much more now.

582

00:34:30,000 --> 00:34:32,000

Look at the little Charvin front.

583

00:34:32,000 --> 00:34:33,000

What is that?

584

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

Will this fit in your carry-on?

585

00:34:35,000 --> 00:34:39,000

You're only allowed to pull the trigger while wearing big glasses.

586

00:34:39,000 --> 00:34:42,000

It looks the business, but Cannon packed the punch.

587

00:34:42,000 --> 00:34:45,000

A six ounce black powder punch.

588

00:34:45,000 --> 00:34:49,000

What I have here is black powder, and this is what we're going to use to launch our cannonball.

589

00:34:49,000 --> 00:34:54,000

Now, one gram of black powder, when ignited, will expand to three liters of gas.

590

00:34:54,000 --> 00:34:56,000

This is six ounces.

591

00:34:56,000 --> 00:35:00,000

When we ignite this, it's going to expand to three 55 gallon drums of gas.

592

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

That is a lot of energy, and that is what's going to fire our ball out of our cannon, or blow our cannon up.

593

00:35:06,000 --> 00:35:08,000

Either way, it's going to be cool.

594

00:35:08,000 --> 00:35:14,000

Next, violence of the hams may be over, but Jamie puts the lotion on the skin.

595

00:35:14,000 --> 00:35:16,000

And finally,

596

00:35:16,000 --> 00:35:19,000

Here he's disguised our cannon as a purse.

597

00:35:19,000 --> 00:35:21,000

Will the luggage leather be lethal?

598

00:35:21,000 --> 00:35:23,000

Let's see what we've got.

599

00:35:51,000 --> 00:35:54,000

Last skin, we're going to get cut.

600

00:35:54,000 --> 00:35:59,000

If I'm going to be testing what happens to someone's scalp when they're hit over the head with a bottle,

601

00:35:59,000 --> 00:36:01,000

I need a suitable scalp analog.

602

00:36:01,000 --> 00:36:08,000

And to find it, Dr. Frankenheim Numen figures out some scalp attributes he wants to emulate.

603

00:36:08,000 --> 00:36:11,000

I figure I'm moving it around a half of an inch.

604

00:36:11,000 --> 00:36:13,000

Seems to be about right.

605

00:36:13,000 --> 00:36:16,000

That's moving about the same as the skin over my skull.

606

00:36:16,000 --> 00:36:18,000

That's perfect.

607

00:36:19,000 --> 00:36:23,000

Poked through it, 2.43 pounds.

608

00:36:23,000 --> 00:36:24,000

Nice.

609

00:36:24,000 --> 00:36:28,000

Thickness, 0.025.

610

00:36:28,000 --> 00:36:31,000

This is very sort of fibrous.

611

00:36:31,000 --> 00:36:35,000

Next, he finds the artificial materials with those physical attributes.

612

00:36:35,000 --> 00:36:38,000

It pulls about the same amount.

613

00:36:38,000 --> 00:36:40,000

This appears to be vinyl.

614

00:36:40,000 --> 00:36:45,000

That's starting to feel like the skin that we all know and love.

615

00:36:45,000 --> 00:36:52,000

With a vinyl epidermis, absorbent, subcutaneous layer, and of course, blood.

616

00:36:52,000 --> 00:36:54,000

Lots of blood.

617

00:36:54,000 --> 00:37:00,000

It all comes together in a disturbingly accurate analog of human skin.

618

00:37:00,000 --> 00:37:06,000

The epidermis goes on it like so, and when I cut it with any luck, it's going to bleed.

619

00:37:06,000 --> 00:37:08,000

And with that...

620

00:37:10,000 --> 00:37:11,000

There you go.

621

00:37:11,000 --> 00:37:16,000

Our fake skinned meathead is ready to take one for the team.

622

00:37:18,000 --> 00:37:19,000

You feel it with blood?

623

00:37:19,000 --> 00:37:20,000

I did.

624

00:37:20,000 --> 00:37:22,000

Alright, let's get this smashing.

625

00:37:24,000 --> 00:37:26,000

Let the lacerations begin.

626

00:37:26,000 --> 00:37:28,000

Laceration test with a full beer bottle.

627

00:37:28,000 --> 00:37:30,000

Three, two, one.

628

00:37:34,000 --> 00:37:35,000

That is nasty.

629

00:37:35,000 --> 00:37:36,000

One.

630

00:37:41,000 --> 00:37:46,000

Oh, oh, there's definitely some cuts there.

631

00:37:46,000 --> 00:37:49,000

Oh, it bleeds. Nasty.

632

00:37:49,000 --> 00:37:50,000

Nasty.

633

00:37:50,000 --> 00:37:57,000

And if it was needed, a further graphic illustration of how dangerous it is to use a bottle as a

weapon.

634

00:37:57,000 --> 00:38:05,000

Just put that there, and we'll put the other one there, and we know that that's our full bottle, and we'll compare it to the empty one.

635

00:38:05,000 --> 00:38:06,000

Okay.

636

00:38:06,000 --> 00:38:08,000

Okay, here we go.

637

00:38:08,000 --> 00:38:13,000

Laceration test, empty beer bottle into our meat buster.

638

00:38:14,000 --> 00:38:16,000

Three, two, one.

639

00:38:19,000 --> 00:38:26,000

A successful smash, and as with the full bottle, it's immediately obvious damage was done.

640

00:38:26,000 --> 00:38:27,000

I like my fake skin.

641

00:38:27,000 --> 00:38:29,000

It's a nice fake skin.

642

00:38:29,000 --> 00:38:36,000

And an up close comparison sees very little difference in the damage to that skin between the two tests.

643

00:38:36,000 --> 00:38:39,000

I don't know about you, but I look at these and they look pretty much equivalent to me.

644

00:38:39,000 --> 00:38:42,000

Yeah, give or take a nick or two, it's the same.

645

00:38:42,000 --> 00:38:43,000

Yeah.

646

00:38:45,000 --> 00:38:48,000

I thought the full bottle was going to be much worse.

647

00:38:48,000 --> 00:38:50,000

It's all about the glass in this case, I think.

648

00:38:50,000 --> 00:38:54,000

Yeah, same amount of glass, I guess, same amount of cuts.

649

00:38:54,000 --> 00:38:55,000

Yep.

650

00:38:56,000 --> 00:39:02,000

The original myth is that having an empty bottle broken over your head is worse for you than having a full bottle broken over your head.

651

00:39:02,000 --> 00:39:06,000

Well, from our testing, from the standpoint of your brains, it's not true.

652

00:39:06,000 --> 00:39:09,000

You'll get a much worse concussion from a full bottle than an empty one.

653

00:39:09,000 --> 00:39:13,000

And also from our testing, on bones, the full bottle is also worse.

654

00:39:13,000 --> 00:39:16,000

It's much more likely to cause a skull fracture than an empty bottle.

655

00:39:16,000 --> 00:39:22,000

Now, with the skin laceration test, actually for the first time, they're about even.

656

00:39:22,000 --> 00:39:26,000

But that still doesn't make the statement that the empty bottle is worse, it's supportable.

657

00:39:26,000 --> 00:39:28,000

So, it's still not looking very good.

658

00:39:28,000 --> 00:39:31,000

In fact, I'd almost say it's busted.

659

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

Okay, the myth that it's worse to have an empty bottle broken over your head than a full bottle, let's recap where we stand from the standpoint of your brains.

660

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

It's busted.

661

00:39:40,000 --> 00:39:42,000

From the standpoint of your skull bone.

662

00:39:42,000 --> 00:39:43,000

Also busted.

663

00:39:43,000 --> 00:39:45,000

From the standpoint of your skin.

664

00:39:45,000 --> 00:39:46,000

No difference.

665

00:39:46,000 --> 00:39:47,000

Well, you know where that leaves us, myth.

666

00:39:47,000 --> 00:39:48,000

Busted.

667

00:39:48,000 --> 00:39:49,000

Totally busted.

668

00:39:52,000 --> 00:40:09,000

Cary, Granted Tory are about to find out if leather can be a lethal cannon.

669

00:40:09,000 --> 00:40:14,000

This is our target, we have a barrier of milk backed by a triangulation of three water barrels.

670

00:40:14,000 --> 00:40:15,000

Why milk?

671

00:40:15,000 --> 00:40:19,000

Well, because it's going to look really cool on high speed when our cannonball crashes into it.

672

00:40:19,000 --> 00:40:26,000

And speaking of high speed, with the aid of the high speed and this scale here, we're going to be able to catch the velocity of the ball and see if it matches our parrot gun.

673

00:40:26,000 --> 00:40:34,000

And finally, here we have our designer inspired ultimate, completely reinforced 100% genuine leather cannon.

674

00:40:34,000 --> 00:40:39,000

If only the Irish had something this stylish at the Siege of Balli Nali Castle.

675

00:40:39,000 --> 00:40:44,000

Well, who knows if the cannon would have exploded, but at least they'd be fighting in style.

676

00:40:44,000 --> 00:40:45,000

You in?

677

00:40:45,000 --> 00:40:46,000

Yep.

678

00:40:46,000 --> 00:40:47,000

That's it.

679

00:40:47,000 --> 00:40:48,000

Okay.

680

00:40:48,000 --> 00:40:49,000

Let's do it.

681

00:40:49,000 --> 00:40:53,000

I think we have a very good chance, 80% at least.

682

00:40:53,000 --> 00:40:56,000

The other 20% is it explodes.

683

00:40:56,000 --> 00:41:01,000

So it's time to find out if the bling leather cannon can.

684

00:41:01,000 --> 00:41:03,000

Here we go.

685

00:41:03,000 --> 00:41:05,000

Designer inspired cannon.

686

00:41:05,000 --> 00:41:12,000

Three, two, one.

687

00:41:12,000 --> 00:41:14,000

Woo!

688

00:41:14,000 --> 00:41:15,000

It worked!

689

00:41:15,000 --> 00:41:17,000

100% leather!

690

00:41:17,000 --> 00:41:18,000

We just put it in the can.

691

00:41:18,000 --> 00:41:19,000

It just blew up!

692

00:41:19,000 --> 00:41:21,000

We did it!

693

00:41:21,000 --> 00:41:23,000

We made a leather cannon!

694

00:41:27,000 --> 00:41:29,000

The reaction says it all.

695

00:41:29,000 --> 00:41:32,000

We made a leather cannon and it worked!

696

00:41:32,000 --> 00:41:36,000

From back behind the blast shields, the test looks to be a success.

697

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

But up close, the evidence begins to contradict their initial reaction.

698

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

Punch through the carton, no problem.

699

00:41:43,000 --> 00:41:44,000

Here.

700

00:41:44,000 --> 00:41:45,000

Hey!

701

00:41:47,000 --> 00:41:52,000

Unlike the parrot rifle, which easily punched through two water barrels, the leather cannon

702

00:41:52,000 --> 00:41:55,000

only just pierced the milk carton.

703

00:41:55,000 --> 00:41:58,000

You're definitely going to give somebody a bruise with that.

704

00:42:00,000 --> 00:42:04,000

A lethality assessment that's backed up by the numbers from the high speed.

705

00:42:04,000 --> 00:42:11,000

So, I've got 77 feet per second, which is 52.5 miles per hour.

706

00:42:11,000 --> 00:42:13,000

Wow!

707

00:42:13,000 --> 00:42:15,000

That's kind of fast.

708

00:42:15,000 --> 00:42:20,000

Yeah, you could drive faster than that cannonball came out of the cannon.

709

00:42:20,000 --> 00:42:23,000

Yeah, but look, it was entirely made out of leather.

710

00:42:23,000 --> 00:42:24,000

That's awesome.

711

00:42:24,000 --> 00:42:25,000

That is awesome.

712

00:42:25,000 --> 00:42:27,000

I mean, that would definitely hurt.

713

00:42:27,000 --> 00:42:28,000

Give you a lump.

714

00:42:29,000 --> 00:42:36,000

And the less than lethal muzzle velocity was caused by what is the final nail in the leather cannon coffin.

715

00:42:36,000 --> 00:42:41,000

The delamination of the barrel and deformation of the combustion chamber.

716

00:42:41,000 --> 00:42:44,000

And that can only mean one thing.

717

00:42:44,000 --> 00:42:51,000

It looked like it was going to be plausible for a second there, but if you can only get one shot out of it, I think this one's busted.

718

00:42:51,000 --> 00:42:52,000

Busted.

719

00:42:52,000 --> 00:42:54,000

Man, what a way to go out.

720

00:42:54,000 --> 00:42:55,000

That's looking cool.

721

00:42:55,000 --> 00:42:58,000

At least we got one good shot out of it.

722

00:43:06,000 --> 00:43:07,000

Leather.

723

00:43:07,000 --> 00:43:10,000

It's good for fashion, not good for artillery.

724

00:43:15,000 --> 00:43:16,000

You want more?

725

00:43:16,000 --> 00:43:17,000

We've got more.

726

00:43:17,000 --> 00:43:22,000

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