1

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

Give us a break. Don't try what you're about to see at home.

2

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

Yeah!

3

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

Could two compressed air cylinders power the world's fastest speedboat?

4

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

Remember, Jamie, experiments like this are 90% mental.

5

00:00:44,000 --> 00:00:50,000

And can an engine fueled by gunpowder do anything but blow itself to pieces?

6

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

It's fast. It's furious.

7

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

It was the lard that did it.

8

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

And it's firing on all cylinders.

9

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

Who are the Mythbusters?

10

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

Adam Savage

11

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

and Jamie Heineman.

12

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

This is gonna kill you.

13

00:01:09,000 --> 00:01:12,000

Between them more than 30 years of special effects experience.

14

00:01:12,000 --> 00:01:14,000

That's what I'm jogging about.

15

00:01:14,000 --> 00:01:16,000

Joining them, Tori Velachie.

16

00:01:16,000 --> 00:01:18,000

Very excited about this.

17

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

Carrie Byron.

18

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

Look, he cracked into his skull.

19

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

And Grant Imahara.

20

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

Don't say anything.

21

00:01:24,000 --> 00:01:26,000

They don't just tell the myths.

22

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

They put them to the test.

23

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

As Adam loves to demonstrate,

24

00:01:40,000 --> 00:01:44,000

there's all sorts of interesting ways to injure yourself on the job.

25

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

It seems danger is everywhere.

26

00:01:51,000 --> 00:01:55,000

But nothing on the workshop floor has quite the deadly potential

27

00:01:55,000 --> 00:01:57,000

of a compressed gas cylinder.

28

00:01:58,000 --> 00:02:00,000

Accidentally snap the valve and any tank

29

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

instantly transforms into a massive rocket with no flight plan.

30

00:02:05,000 --> 00:02:08,000

Now, that's a fact, but what's the myth?

31

00:02:12,000 --> 00:02:14,000

Well, we touched upon it a little during Shark Week,

32

00:02:14,000 --> 00:02:16,000

but I don't think we finished it.

33

00:02:16,000 --> 00:02:18,000

I remember that thing.

34

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

Yeah, compressed air cylinders.

35

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

And there are no end to the stories that people tell

36

00:02:21,000 --> 00:02:24,000

about the kind of damage that they can do.

37

00:02:24,000 --> 00:02:26,000

Well, this one just made a really big boom,

38

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

but you're talking about where they take off like a rocket

39

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

and go through a concrete wall, right?

40

00:02:30,000 --> 00:02:31,000

Exactly.

41

00:02:31,000 --> 00:02:33,000

And that is precisely the myth that we'll be testing.

42

00:02:34,000 --> 00:02:36,000

Adam and Jamie have some experience to draw on.

43

00:02:36,000 --> 00:02:38,000

Back in their jaw special,

44

00:02:38,000 --> 00:02:42,000

they blew a scuba tank with a wad of C4 explosive.

45

00:02:47,000 --> 00:02:50,000

Then shot another tank with a high-powered rifle.

46

00:02:50,000 --> 00:02:53,000

It didn't grow up, but it sure went off.

47

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

And if a cylinder rocket can bend solid steel,

48

00:02:57,000 --> 00:03:00,000

what's it going to do to a concrete wall?

49

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

As far as I'm concerned,

50

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

there really is only one way to test this thing.

51

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

Well, yeah, we have to fire it at a cinder block wall.

52

00:03:07,000 --> 00:03:09,000

So we're going to need a selection of air cylinders

53

00:03:09,000 --> 00:03:11,000

and some regulators on them.

54

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

We're going to need a cinder block wall to fire them into

55

00:03:14,000 --> 00:03:17,000

and some kind of method for catastrophically taking

56

00:03:17,000 --> 00:03:19,000

that regulator right off.

57

00:03:19,000 --> 00:03:21,000

And also we have to figure out how to make sure

58

00:03:21,000 --> 00:03:22,000

it actually hits the wall.

59

00:03:22,000 --> 00:03:24,000

I mean, what if this thing just kind of goes...

60

00:03:24,000 --> 00:03:27,000

I think I want to be outside the building

61

00:03:27,000 --> 00:03:29,000

that we're testing this inside of.

62

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

To test the myth,

63

00:03:31,000 --> 00:03:33,000

they'll need to aim the cylinder like a missile,

64

00:03:33,000 --> 00:03:37,000

devise some way to sever the valve in a split second,

65

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

and build a wall to aim at.

66

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

They'll have to start work on the wall first,

67

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

so Jamie's assistants, Terry and Tyler,

68

00:03:45,000 --> 00:03:48,000

get commissioned as Mythbuster Masons.

69

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

So I'm going to set you up,

70

00:03:50,000 --> 00:03:53,000

and it's going to be in your hands to make sure it all happens.

71

00:03:53,000 --> 00:03:55,000

So don't screw up.

72

00:03:55,000 --> 00:03:57,000

I'll kick your butt.

73

00:03:57,000 --> 00:04:00,000

Walls are useful for all sorts of things,

74

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

like holding up the roof.

75

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

So punching a high-speed hole through a supporting wall

76

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

might not be such a good idea.

77

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

This freestanding barricade won't be pretty,

78

00:04:12,000 --> 00:04:15,000

but it will be, well, great.

79

00:04:15,000 --> 00:04:18,000

Meantime, Adam is checking the myth with a man

80

00:04:18,000 --> 00:04:23,000

whose whole working life has been spent under extreme pressure.

81

00:04:23,000 --> 00:04:28,000

George Ratterman supplies valves and cylinders across the USA,

82

00:04:28,000 --> 00:04:30,000

and like most of us,

83

00:04:30,000 --> 00:04:34,000

he's heard all of those explosive stories secondhand.

84

00:04:34,000 --> 00:04:38,000

The first thing we've heard is that if you knock off the valve to a cylinder,

85

00:04:38,000 --> 00:04:41,000

they can fly right through a brick wall.

86

00:04:41,000 --> 00:04:43,000

Yeah, you know, that is the myth.

87

00:04:43,000 --> 00:04:45,000

I've heard that from a number of people.

88

00:04:45,000 --> 00:04:47,000

In most cases, you ask them a few more questions,

89

00:04:47,000 --> 00:04:49,000

and they actually weren't there.

90

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

I think somebody else told them.

91

00:04:51,000 --> 00:04:53,000

And most of the time what the story is,

92

00:04:53,000 --> 00:04:55,000

it would take off and it would usually go through a cinder-brack wall,

93

00:04:55,000 --> 00:04:57,000

disappear, go out in the field,

94

00:04:57,000 --> 00:04:59,000

or else possibly be found, you know,

95

00:04:59,000 --> 00:05:01,000

through a couple more fences or something.

96

00:05:01,000 --> 00:05:04,000

We want to build this rig that shears the valve right off of this,

97

00:05:04,000 --> 00:05:08,000

and the first test rig is a large weight in a guided tube

98

00:05:08,000 --> 00:05:12,000

that comes down right on top of the cylinder and knocks it right off.

99

00:05:12,000 --> 00:05:14,000

I mean, do you think that's going to work?

100

00:05:14,000 --> 00:05:16,000

I don't know if that's going to work.

101

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

You're going to have to give and break into only a partial break,

102

00:05:19,000 --> 00:05:22,000

and that's when you're really going to get a spinning effect of the vessel.

103

00:05:22,000 --> 00:05:28,000

And remember, we're talking an ankle-smashing 140-pound steel cylinder.

104

00:05:28,000 --> 00:05:31,000

Even a partial shear could send this thing ballistic.

105

00:05:31,000 --> 00:05:36,000

It might also start spinning erratically, which Jamie calls rat-chasing.

106

00:05:36,000 --> 00:05:38,000

To ensure that doesn't happen,

107

00:05:38,000 --> 00:05:41,000

the tank needs a long, sturdy guide rail

108

00:05:41,000 --> 00:05:44,000

to guarantee it takes off in a straight line.

109

00:05:44,000 --> 00:05:47,000

I've got a builder rig that does a couple of different things.

110

00:05:47,000 --> 00:05:51,000

The first thing is that it has to hold this tank steady in such a place

111

00:05:51,000 --> 00:05:54,000

that we can drop a heavy weight on the valve and knock it off.

112

00:05:54,000 --> 00:05:59,000

The second thing is that same holder is going to guide it as it takes off

113

00:05:59,000 --> 00:06:02,000

so that once it gets going, it's aimed in a certain direction,

114

00:06:02,000 --> 00:06:05,000

and it'll hit the wall at speed, we hope.

115

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

Good. It looks like it fits fine.

116

00:06:09,000 --> 00:06:11,000

To sever the valve,

117

00:06:11,000 --> 00:06:17,000

he's fitting a hinged 10-foot tube to drop a 40-pound steel bar bang on the nozzle.

118

00:06:19,000 --> 00:06:22,000

Adams borrowed some tea-sized tanks from George,

119

00:06:22,000 --> 00:06:26,000

so all they need now is a good, solid target.

120

00:06:26,000 --> 00:06:28,000

I think we got everything.

121

00:06:28,000 --> 00:06:33,000

All right. Well, let's get out there and try and blow one of these cylinders through the wall.

122

00:06:35,000 --> 00:06:39,000

This military bunker is the perfect place to test what we all hope

123

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

will be the world's first and most destructive land torpedo.

124

00:06:45,000 --> 00:06:48,000

Seems Terry and Tyler did a first-rate job.

125

00:06:48,000 --> 00:06:50,000

It works for me.

126

00:06:53,000 --> 00:06:55,000

I think this will do just fine.

127

00:06:55,000 --> 00:06:59,000

Yeah, that seems nice and solid.

128

00:06:59,000 --> 00:07:02,000

It's not quite as big as the side of a barn,

129

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

but the question remains, can the cylinder actually hit it?

130

00:07:06,000 --> 00:07:09,000

So I'm thinking that when we set up the rig over by the door,

131

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

we want to make sure those doors are as close as we can get them.

132

00:07:12,000 --> 00:07:18,000

Okay. Well, they are, in theory, rockets, so we should be careful with them.

133

00:07:19,000 --> 00:07:21,000

To help the rocket on its way,

134

00:07:21,000 --> 00:07:23,000

Myth Turn Jess gets to grips with the lard.

135

00:07:23,000 --> 00:07:26,000

Trust Jamie to always have a bucket or two on hand.

136

00:07:26,000 --> 00:07:31,000

It's cheap, it's smelly, and it's a great way to reduce friction.

137

00:07:32,000 --> 00:07:37,000

It's important to be judicious about your lard distribution, Jess.

138

00:07:37,000 --> 00:07:39,000

The rig is greased and ready,

139

00:07:39,000 --> 00:07:43,000

but will the steel bar have enough momentum to break the nozzle?

140

00:07:43,000 --> 00:07:48,000

This is a 2 by 2 inch solid steel bar,

141

00:07:48,000 --> 00:07:51,000

and it weighs, I think, officially a heck of a lot.

142

00:07:52,000 --> 00:07:55,000

That's 40 pounds dropped from a height of 10 feet.

143

00:07:55,000 --> 00:07:58,000

It's a classic case of a square peg in a round hole,

144

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

and that surely deserves a test run.

145

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

Piece of a brick right there that'll keep the end of our piece of steel from getting too damaged.

146

00:08:07,000 --> 00:08:09,000

Three, two, one.

147

00:08:11,000 --> 00:08:12,000

Oh, yeah.

148

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

That looks pretty serious.

149

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

If a 40 pound bar can do this,

150

00:08:18,000 --> 00:08:22,000

just imagine what a 140 pound gas tank could do.

151

00:08:22,000 --> 00:08:26,000

If all goes to plan, it's looking curtains for our wall.

152

00:08:26,000 --> 00:08:30,000

Shooting the scuba tank with a 30-odd 6, that was awesome.

153

00:08:33,000 --> 00:08:37,000

And I have never felt like we were totally done with that

154

00:08:37,000 --> 00:08:39,000

until 10 minutes from now.

155

00:08:39,000 --> 00:08:45,000

Coming up, Carrie Grant and Tori put gasoline and gunpowder to the test

156

00:08:45,000 --> 00:08:48,000

in a giant homemade cylinder.

157

00:08:49,000 --> 00:08:52,000

And the boys get ready to bring the house down.

158

00:08:52,000 --> 00:08:57,000

Shearing the compressed air cylinder in three, two, one.

159

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

Now, here's a motor myth that's way overdue for testing.

160

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

In fact, it's a classic blast from the past.

161

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

Most modern engines run on gasoline,

162

00:09:15,000 --> 00:09:18,000

but it wasn't always the fuel of choice.

163

00:09:18,000 --> 00:09:23,000

Some mechanical pioneers favored a more explosive kind of combustion.

164

00:09:29,000 --> 00:09:33,000

Trying to test the claim that you can run an engine using only gunpowder.

165

00:09:33,000 --> 00:09:37,000

Sounds easy enough. Get an engine, add black powder, ignite.

166

00:09:37,000 --> 00:09:39,000

Hang on a minute.

167

00:09:39,000 --> 00:09:42,000

There have been a lot of people that have tried this through the ages.

168

00:09:42,000 --> 00:09:44,000

Maybe we should try a few of their experiments

169

00:09:44,000 --> 00:09:47,000

just to see if we can learn from their mistakes.

170

00:09:47,000 --> 00:09:50,000

Finally, we get to learn from somebody else's mistakes.

171

00:09:52,000 --> 00:09:56,000

The common sense tells us the words engine and gunpowder

172

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

shouldn't even be used in the same sentence.

173

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

But the respected men of science who designed our three test engines

174

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

clearly thought otherwise.

175

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

And Tori's not going to learn from anyone's mistakes

176

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

because as far as we know, not one of these engines was ever actually built.

177

00:10:16,000 --> 00:10:20,000

The gunpowder fuel they plan to use is often called black powder.

178

00:10:20,000 --> 00:10:25,000

It's a volatile mix of sulfur, salt-peter and charcoal.

179

00:10:25,000 --> 00:10:30,000

But before the team even thinks about putting this lethal compound in an engine,

180

00:10:30,000 --> 00:10:35,000

it's worth finding out if it really has the kick needed to push a piston.

181

00:10:35,000 --> 00:10:38,000

Well, we think there could be some really good reasons

182

00:10:38,000 --> 00:10:41,000

why you'd want to use black powder in an engine.

183

00:10:41,000 --> 00:10:47,000

To demonstrate that, we're going to do a comparison between black powder and gasoline.

184

00:10:48,000 --> 00:10:52,000

For this first experiment, they custom-built a super-sized piston

185

00:10:52,000 --> 00:10:57,000

to test the comparative grunt of gasoline and gunpowder.

186

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

To check that the seal works, they need an air pressure test.

187

00:11:05,000 --> 00:11:08,000

And Carrie can't resist going along for the ride.

188

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

Let me in! Let me in!

189

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

Well, the piston works.

190

00:11:17,000 --> 00:11:21,000

Operations move out to the car park and into the blast chamber.

191

00:11:21,000 --> 00:11:25,000

That's an indication of how much faith they have in the black powder.

192

00:11:26,000 --> 00:11:30,000

Black powder comes with its own oxidizer, so unlike gasoline,

193

00:11:30,000 --> 00:11:34,000

which you need to inject a certain amount of air to get it to combust,

194

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

black powder is ready to go all the time.

195

00:11:37,000 --> 00:11:41,000

Finding which fuel produces more energy is easy enough to measure.

196

00:11:41,000 --> 00:11:45,000

A magnet sitting on top of the piston should stick to this metal scale,

197

00:11:45,000 --> 00:11:48,000

just where the piston hits the top of its stroke.

198

00:11:49,000 --> 00:11:51,000

First, the gasoline.

199

00:11:53,000 --> 00:11:56,000

Then a propane flame to vaporize it.

200

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

Gas mission in three, two, one.

201

00:12:02,000 --> 00:12:04,000

Yeah!

202

00:12:05,000 --> 00:12:08,000

The gasoline-powered piston has made its mark.

203

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

No, it couldn't have gone up there.

204

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

So it accelerated it all the way up here.

205

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

So will the black powder measure up?

206

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

Grants quietly confident.

207

00:12:17,000 --> 00:12:21,000

Our research indicates that black powder has a lot more energy density.

208

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

They wait for the flame to ignite the powder.

209

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

There we go. Perfect.

210

00:12:28,000 --> 00:12:31,000

They don't call it gunpowder for nothing.

211

00:12:31,000 --> 00:12:34,000

Wow, it shot the magnet off the scale.

212

00:12:34,000 --> 00:12:38,000

This is where the gasoline magnet got shot to.

213

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

And there is where the black powder magnet got shot to.

214

00:12:43,000 --> 00:12:46,000

Well, that's fairly conclusive.

215

00:12:47,000 --> 00:12:50,000

Black powder does have more energy density than regular gasoline,

216

00:12:50,000 --> 00:12:53,000

meaning you need less of it to get the same amount of power.

217

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

So it is a sound concept.

218

00:12:56,000 --> 00:13:01,000

But what happens when a sound concept meets an unsound engine?

219

00:13:01,000 --> 00:13:05,000

There's still three combustible contraptions to put to the test.

220

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

High-pressure gas cylinders have been around for a hundred years,

221

00:13:14,000 --> 00:13:19,000

and legends of their destructive potential have been around for 99.

222

00:13:19,000 --> 00:13:23,000

But could a ruptured tank really borrow through a brick wall?

223

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

Back at the bunker, Adam and Jamie are about to find out.

224

00:13:29,000 --> 00:13:31,000

Alright, I'm arming the rig.

225

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

Arming the rig means unscrewing the protective cap.

226

00:13:35,000 --> 00:13:38,000

All that remains is to pull the string that releases the weight,

227

00:13:38,000 --> 00:13:41,000

that hopefully guillotines the valve.

228

00:13:41,000 --> 00:13:42,000

Alright, ladies and germs,

229

00:13:42,000 --> 00:13:47,000

shearing the compressed air cylinder in three, two, one.

230

00:13:47,000 --> 00:13:52,000

This is close to a worst-case scenario.

231

00:13:52,000 --> 00:13:55,000

As feared, the valve was only partially sheared,

232

00:13:55,000 --> 00:13:58,000

so the cylinder went absolutely nowhere.

233

00:13:58,000 --> 00:14:01,000

I'm going to wait however long it takes for it to let go of its air,

234

00:14:01,000 --> 00:14:03,000

because it's got a damaged valve,

235

00:14:03,000 --> 00:14:07,000

and that valve could give any minute and, you know, become a bullet.

236

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

It's a very slow leak,

237

00:14:09,000 --> 00:14:12,000

so the boys have 45 minutes to stand well back

238

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

and then pull the string back.

239

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

They have 45 minutes to stand well back

240

00:14:18,000 --> 00:14:21,000

and revise their plans.

241

00:14:21,000 --> 00:14:26,000

After the break, the world's first gunpowder engine is cocked and loaded.

242

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

Fire in the hole!

243

00:14:28,000 --> 00:14:32,000

Then Jamie and Adam reset for the final countdown.

244

00:14:32,000 --> 00:14:36,000

Cross your fingers. Three, two, one.

245

00:14:44,000 --> 00:14:47,000

Carrie Grant and Tori are out to test the myth

246

00:14:47,000 --> 00:14:50,000

that an engine can actually run on gunpowder.

247

00:14:50,000 --> 00:14:55,000

They've shown that black powder definitely has the muscle to move a piston.

248

00:14:55,000 --> 00:14:59,000

This is where the gasoline magnet got shot to,

249

00:14:59,000 --> 00:15:04,000

and there is where the black powder magnet got shot to.

250

00:15:04,000 --> 00:15:07,000

Now to build a primitive kind of proto-engine,

251

00:15:07,000 --> 00:15:10,000

specifically designed to run on powder.

252

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

It was dreamed up by a Dutchman named Christian Hoegens more than 300 years ago.

253

00:15:16,000 --> 00:15:21,000

His blueprint was the very first to feature a piston in a cylinder.

254

00:15:21,000 --> 00:15:23,000

When the black powder ignites,

255

00:15:23,000 --> 00:15:27,000

expanding gases are meant to force air out of two valves,

256

00:15:27,000 --> 00:15:30,000

creating a vacuum that sucks the piston down.

257

00:15:30,000 --> 00:15:32,000

It looks pretty easy, pretty straightforward.

258

00:15:32,000 --> 00:15:35,000

Whether or not it's going to work, that's going to be the hard part.

259

00:15:36,000 --> 00:15:39,000

The design is simple, and a lot easier to build now

260

00:15:39,000 --> 00:15:42,000

than it would have been in 1680.

261

00:15:43,000 --> 00:15:47,000

Total success means getting a near-perfect vacuum.

262

00:15:47,000 --> 00:15:50,000

That's a tricky thing to do with so many moving parts,

263

00:15:50,000 --> 00:15:54,000

especially when you have to drill a hole for the fuse.

264

00:15:54,000 --> 00:15:59,000

There's a hole down here. That's not going to give you a vacuum.

265

00:15:59,000 --> 00:16:01,000

That's what the problem is.

266

00:16:01,000 --> 00:16:04,000

We have to have that hole there to ignite the black powder.

267

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

How are you going to get a vacuum then?

268

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

I'm just going from the designs of Hoegen.

269

00:16:09,000 --> 00:16:11,000

Should we raise them for the dead?

270

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

Well, I finished my Hoegen's black powder engine.

271

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

Now what we're going to do, I drilled a little hole at the bottom cap.

272

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

We're going to fill this up with some gunpowder,

273

00:16:22,000 --> 00:16:25,000

put a remote fuse in there, light it,

274

00:16:25,000 --> 00:16:30,000

and see if it does in fact raise up our weight.

275

00:16:30,000 --> 00:16:36,000

I am not sure if we're going to get a good enough vacuum,

276

00:16:36,000 --> 00:16:40,000

and that's the whole principle that this Hoegen's engine works on.

277

00:16:40,000 --> 00:16:44,000

But, you know, there's only one way to find out.

278

00:16:44,000 --> 00:16:47,000

Here we go in three, two, one.

279

00:16:47,000 --> 00:16:49,000

Oh, God, did you feel that?

280

00:16:49,000 --> 00:16:53,000

The vacuum! It's sucking me in! It was huge!

281

00:16:53,000 --> 00:16:55,000

Yeah, it sure does suck.

282

00:16:55,000 --> 00:16:57,000

But the weight did rise a little,

283

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

which means the piston moved slightly in the cylinder.

284

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

Dude, it totally pulled it down. Look at this.

285

00:17:02,000 --> 00:17:07,000

Well, if it were a vacuum, it would have been holding like you wouldn't have been able to pull it back.

286

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

So they upped the charge from 15 to 20 grains.

287

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

In three, two, one.

288

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

It looks like Hoegen's original draft is just a little bit too...drafty.

289

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

We have two things working against us.

290

00:17:23,000 --> 00:17:27,000

Our seal between the piston and the chamber isn't completely airtight.

291

00:17:27,000 --> 00:17:32,000

We got it as tight as possible, but there's still some leaks, so we're not getting a true vacuum.

292

00:17:32,000 --> 00:17:37,000

And then also our one-way valves. They're not totally airtight either.

293

00:17:37,000 --> 00:17:43,000

Modern machining gave the engine a better chance of success than Hoegen's could have imagined,

294

00:17:43,000 --> 00:17:45,000

and it still didn't work.

295

00:17:45,000 --> 00:17:49,000

One black powder engine down, two to go.

296

00:17:49,000 --> 00:17:51,000

But there's reason to be hopeful.

297

00:17:52,000 --> 00:17:57,000

Just running through this experiment, though, you can see why people were so intrigued by the whole black powder engine.

298

00:17:57,000 --> 00:17:59,000

It takes so little to create so much force.

299

00:17:59,000 --> 00:18:06,000

And soon they'll see if that force makes or breaks an engine George Cayley had high hopes for.

300

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

Adam and Janie are trying to figure out what went wrong with their first attempt to blast an air cylinder through a brick wall.

301

00:18:21,000 --> 00:18:23,000

I can still see it.

302

00:18:23,000 --> 00:18:25,000

Yeah, it hasn't moved.

303

00:18:25,000 --> 00:18:30,000

In best misbusters tradition, they decide to tinker with just about everything.

304

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

So this second time around we've added more weight.

305

00:18:34,000 --> 00:18:41,000

We've lubricated the whole weight system so that it'll be more slippery when it goes down.

306

00:18:41,000 --> 00:18:47,000

And then probably most importantly though, we've moved the valve placement slightly so that the weight when it hits it

307

00:18:47,000 --> 00:18:50,000

will hit right on the very tip of the valve.

308

00:18:50,000 --> 00:18:54,000

And that'll provide the most leverage and hopefully snap it more readily.

309

00:18:54,000 --> 00:18:59,000

Calm, steady words from a man who's hoping to launch a gas cylinder into the next county.

310

00:18:59,000 --> 00:19:02,000

Here we go. Shearing the regulator off the tank.

311

00:19:02,000 --> 00:19:06,000

Attempt number two and five.

312

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

Four, cross your fingers.

313

00:19:08,000 --> 00:19:11,000

Three, two, one.

314

00:19:12,000 --> 00:19:20,000

Yeah! That's the sound!

315

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

That is a lovely, lovely sound.

316

00:19:28,000 --> 00:19:32,000

The valve has sheared clean off and that's a very good sign.

317

00:19:32,000 --> 00:19:39,000

It looks like the cylinder flew straight and true, but did it have enough thrust to crack the wall?

318

00:19:42,000 --> 00:19:45,000

Oh my God.

319

00:19:46,000 --> 00:19:49,000

It was the lard that did it.

320

00:19:51,000 --> 00:19:56,000

At 40 miles per hour, the air tank turned the cinder block to cinders.

321

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

It even put a fair dent in the wall six feet behind it.

322

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

It totally, I mean it didn't go all the way through, but it went through this one and it was going, it's working this way through that one.

323

00:20:07,000 --> 00:20:10,000

I was ready to, I was ready to see this as not possible.

324

00:20:10,000 --> 00:20:18,000

I was totally expecting it not to actually work because it's one of those apocool tales and everyone we talked to had heard the story, but no one knew anybody that it happened to.

325

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

You know, this was an optimum situation for this tank.

326

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

What this tank did is as good as it gets.

327

00:20:28,000 --> 00:20:32,000

My favorite thing is this perfect roundness of the top of this hole.

328

00:20:32,000 --> 00:20:36,000

It also pushed this entire wall back a half minute.

329

00:20:38,000 --> 00:20:44,000

Although the cylinder was deliberately aimed, you couldn't ask for a more convincing result.

330

00:20:44,000 --> 00:20:49,000

So let's call this myth totally and spectacularly confirmed.

331

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

Next up, the gunpowder plot thickens.

332

00:20:55,000 --> 00:20:59,000

And Jamie finds a boat that's fit to run on rocket power.

333

00:21:03,000 --> 00:21:06,000

Give us a break.

334

00:21:06,000 --> 00:21:10,000

Don't try anything you're about to see us do at home.

335

00:21:10,000 --> 00:21:16,000

Cary Grant and Tori are hell bent on proving an engine can run on gunpowder.

336

00:21:16,000 --> 00:21:18,000

Bar in the hole!

337

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

But could this really be a viable alternative to gasoline?

338

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

They've already built, tested and been disappointed by a black powder engine designed for the first time in a long time.

339

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

So it's back to the drawing board.

340

00:21:31,000 --> 00:21:37,000

You know what our problem is going to be is getting an engine to start and sustain itself using black powder.

341

00:21:37,000 --> 00:21:40,000

I do remember coming across a black powder engine.

342

00:21:40,000 --> 00:21:46,000

I think it was Sir George Cayley, the guy who did the first glider and he was the father of modern aerodynamics.

343

00:21:46,000 --> 00:21:53,000

He had wanted to make a flying machine that was completely powered by a black powder engine that reloaded its engine.

344

00:21:53,000 --> 00:21:57,000

So I mean, I bet we could find some plans floating around the files somewhere.

345

00:21:57,000 --> 00:22:02,000

Thanks to the graphics department, we can see it would have looked something like this.

346

00:22:02,000 --> 00:22:08,000

When the powder ignites, the air expands into the reservoir cylinder, pushing the piston up.

347

00:22:08,000 --> 00:22:13,000

Then at the top of the stroke, a bone string pushes the piston back down.

348

00:22:13,000 --> 00:22:19,000

On each rise, the piston turns a stopcock, which funnels more gas than the piston.

349

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

On each rise, the piston turns a stopcock, which funnels more gunpowder into the system.

350

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

And so the cycle is repeated.

351

00:22:27,000 --> 00:22:31,000

And repetition is the key to a working engine.

352

00:22:31,000 --> 00:22:35,000

Maybe the gunpowder engine could be making a big comeback here.

353

00:22:35,000 --> 00:22:40,000

We could get rid of all of our fossil fuel dependence.

354

00:22:40,000 --> 00:22:45,000

Knocking up a 19th century engine poses no problems.

355

00:22:46,000 --> 00:22:53,000

And luckily, they even have a bow handy, a leftover from the split-arrow myth.

356

00:22:53,000 --> 00:22:59,000

They string it over the piston, and pretty soon, Kaylee's drawing comes to life.

357

00:22:59,000 --> 00:23:08,000

The clever part is that it reloads the gunpowder every single time, hopefully, so that this piston will keep going and we've created an engine.

358

00:23:08,000 --> 00:23:14,000

Big explosion, a lot of screaming, some fun. Hopefully safe, fun.

359

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

I'm feeling supremely confident, actually, in this device.

360

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

I think it's at least going to give us two cycles. It's probably going to give us more, depending on how much gunpowder we put in the reservoir.

361

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

They fuel up, or should that be load up?

362

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

Remember, you don't want to put more than you need.

363

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

Thank you, Tori.

364

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

There's one going in.

365

00:23:31,000 --> 00:23:36,000

That's five grains of black powder. Will it be enough to get this engine turning over?

366

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

Move it.

367

00:23:37,000 --> 00:23:38,000

Alright, we're lit.

368

00:23:44,000 --> 00:23:52,000

Okay, it sort of worked. The expanding gases did push the piston up, and the bow string did reset the pistons.

369

00:23:52,000 --> 00:23:59,000

But the reload mechanism didn't? Well, reload. Still, it's not like the whole thing's gone up in smoke.

370

00:23:59,000 --> 00:24:10,000

It actually worked, and it didn't fall apart. We had one good stroke, but unfortunately, our hopper seemed to have shot or knocked out all of our gunpowder, which flashed when it hit the propane.

371

00:24:10,000 --> 00:24:15,000

The answer? Some aluminum foil over the hopper, which should keep the powder in place.

372

00:24:15,000 --> 00:24:17,000

Take two.

373

00:24:17,000 --> 00:24:22,000

Remember, for proof of concept, the engine has to complete at least two cycles.

374

00:24:25,000 --> 00:24:34,000

Once again, the engine only manages a single stroke. The problem this time is Carrie's reload mechanism can't keep up.

375

00:24:34,000 --> 00:24:37,000

It's happening too fast to dump the black powder in there.

376

00:24:37,000 --> 00:24:41,000

It's not going to just fall into the little groove really, really quickly if it's just a...

377

00:24:41,000 --> 00:24:47,000

Basically, the action is so fast and violent, it doesn't have time to reload.

378

00:24:47,000 --> 00:24:52,000

That means a black mark for another black powder engine.

379

00:24:56,000 --> 00:25:01,000

Adam and Jamie have already proved the power of a well-aimed T-type air tank.

380

00:25:01,000 --> 00:25:06,000

It was a cylinder one, wall, nothing. It was almost too easy.

381

00:25:06,000 --> 00:25:10,000

I'm now wondering what we do to harness this kind of power.

382

00:25:10,000 --> 00:25:13,000

Why don't we put a saddle on it and take a ride? What do you think?

383

00:25:13,000 --> 00:25:18,000

No, no, no. A speedboat. Let's put a couple of them in a boat and see how fast we can go on the water.

384

00:25:18,000 --> 00:25:20,000

That might be a little safer.

385

00:25:20,000 --> 00:25:29,000

In place of a normal engine, they plan to fit two monster air tanks with 5,200 pounds of pent-up pressure between them.

386

00:25:29,000 --> 00:25:34,000

Adam has to build a throttle that releases both valves at precisely the same time.

387

00:25:34,000 --> 00:25:39,000

And Jamie needs to buy a boat that won't blow the budget.

388

00:25:39,000 --> 00:25:43,000

This one's a lean 16-footer, designed for high speed.

389

00:25:43,000 --> 00:25:48,000

It's also missing a motor, a dashboard, and a steering wheel.

390

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

So I assume it floats, right?

391

00:25:50,000 --> 00:25:53,000

I've never had it in the water, so you're going to have to go on faith.

392

00:25:53,000 --> 00:25:56,000

So there you have it, a boat that never left the driveway.

393

00:25:56,000 --> 00:25:59,000

At least there should be no sentimental attachment.

394

00:25:59,000 --> 00:26:01,000

You've seen the show before, right?

395

00:26:01,000 --> 00:26:02,000

Oh yes, big fans.

396

00:26:02,000 --> 00:26:07,000

So you're aware that there's a strong likelihood that we're going to do something horrible to your boat?

397

00:26:07,000 --> 00:26:09,000

Yes, yeah.

398

00:26:09,000 --> 00:26:17,000

You have any kind of remorse or anything about seeing your boat potentially turned into shrapnel?

399

00:26:17,000 --> 00:26:20,000

We were sort of expecting it, that that could happen to it.

400

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

Selling your boat to the Mythbusters must feel something like selling your horse to the Glue Factory.

401

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

Still, the deal is struck and it smiles all around.

402

00:26:29,000 --> 00:26:32,000

Of course you know that the two happiest days of a boat are in life.

403

00:26:32,000 --> 00:26:35,000

The day that you buy a boat, the day that you sell it.

404

00:26:35,000 --> 00:26:38,000

I think this is one of those days.

405

00:26:38,000 --> 00:26:41,000

And it's one of those days for Jamie too.

406

00:26:41,000 --> 00:26:48,000

There's no feeling quite so rewarding as carefully customizing your very own speed boat.

407

00:26:48,000 --> 00:26:52,000

It always brightens my mood when we get to break out the sledgehammer.

408

00:26:52,000 --> 00:26:56,000

The team has just one day to get through a titanic amount of work.

409

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

They've decided to mount the seat between the two tanks.

410

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

And for some obscure nautical reason, they're using Adam's Posterior as a yardstick.

411

00:27:07,000 --> 00:27:11,000

The minimum is going to be like about 15 inches.

412

00:27:11,000 --> 00:27:15,000

Wait, you're going too far. I'm going inside of my hands.

413

00:27:15,000 --> 00:27:18,000

Yeah, you're squeezing and that's 14 inches.

414

00:27:18,000 --> 00:27:23,000

Why Jamie needs an accurate measure of Adam's buttocks is anyone's guess.

415

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

But it is time they both got the lead out.

416

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

So with a little elbow grease, then some screws and a strong epoxy glue for the baseboard,

417

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

our dual inboard rockets are finally hauled on board.

418

00:27:38,000 --> 00:27:42,000

And strapped down tight.

419

00:27:42,000 --> 00:27:46,000

Dude, I love it. I'm starting to get excited.

420

00:27:46,000 --> 00:27:52,000

And although Adam's backside set the standard, it's Jamie who will be steering the ship.

421

00:27:52,000 --> 00:27:58,000

Go ahead and have a seat.

422

00:28:02,000 --> 00:28:06,000

To ensure these two cylinders fire at precisely the same time,

423

00:28:06,000 --> 00:28:10,000

the factory fitted nozzles are being replaced with ball valves.

424

00:28:10,000 --> 00:28:16,000

They'll both be hooked up to a single linkage, devised and built by our very own Adam Savage.

425

00:28:16,000 --> 00:28:20,000

We'll have a lever here or here and we will activate that lever.

426

00:28:20,000 --> 00:28:25,000

It'll open up the valves, releasing the pressure and hopefully what we'll see out of this boat

427

00:28:25,000 --> 00:28:29,000

is what we saw on our tank in the concrete wall experiment.

428

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

Two hours later and that scratch build throttle is up and running.

429

00:28:33,000 --> 00:28:37,000

It's simple, it's purely mechanical and it works.

430

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

This is the business end. It's a half inch bore, 2600 psi coming through each one.

431

00:28:42,000 --> 00:28:48,000

It was enough to drive a single 150 pound tank through a wall and halfway through a second wall.

432

00:28:48,000 --> 00:28:52,000

The question is, is two of them enough to drive a rocket boat?

433

00:28:52,000 --> 00:28:59,000

Still to come, a paddle wheel outboard that could make or break the myth of black powder engine.

434

00:29:08,000 --> 00:29:15,000

Our black powder dynamos have already brought two antique engines to life.

435

00:29:15,000 --> 00:29:19,000

Then watch them die a sad death.

436

00:29:19,000 --> 00:29:21,000

So that leaves us where?

437

00:29:21,000 --> 00:29:23,000

Back at square one.

438

00:29:23,000 --> 00:29:27,000

Not actually. Since we've been dealing with an internal combustion engine,

439

00:29:27,000 --> 00:29:31,000

I was thinking, hey, let's try an external combustion engine.

440

00:29:31,000 --> 00:29:35,000

Let's get rid of the piston and we'll make like a water wheel.

441

00:29:35,000 --> 00:29:39,000

Tari's thinking of Thomas Paine's 19th century radial engine,

442

00:29:39,000 --> 00:29:42,000

which does work much like a water wheel.

443

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

But what if we replaced water power with the grunt of gunpowder?

444

00:29:49,000 --> 00:29:55,000

Okay, well, well, Tari works in the opposite direction of engineering history.

445

00:29:55,000 --> 00:29:59,000

How about you and I go find ourselves an internal combustion engine,

446

00:29:59,000 --> 00:30:03,000

something that's already a successful engine and try to adapt it to black powder?

447

00:30:03,000 --> 00:30:07,000

Well, it should work in theory. Sounds good.

448

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

While Tari starts work on his black powder wheel,

449

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

Grant and Carrie will take a regular four stroke engine,

450

00:30:15,000 --> 00:30:19,000

replace gas with gunpowder and try to rev it up.

451

00:30:19,000 --> 00:30:23,000

Before they do that, one or two questions need answering.

452

00:30:23,000 --> 00:30:29,000

First test that we have to perform is to see whether this spark plug can ignite the black powder.

453

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

Using a drill, Grant will run the engine manually to see if the spark plug spark

454

00:30:34,000 --> 00:30:38,000

is enough to ignite five grains of gunpowder.

455

00:30:39,000 --> 00:30:43,000

Woo! Yeah! It worked!

456

00:30:43,000 --> 00:30:45,000

Okay, good. Nice!

457

00:30:45,000 --> 00:30:46,000

Great.

458

00:30:46,000 --> 00:30:49,000

For his Thomas Paine designed radial engine,

459

00:30:49,000 --> 00:30:53,000

Tari's lined the perimeter of a wagon wheel with metal cups.

460

00:30:53,000 --> 00:30:57,000

The expanding gases from the powder, ignited in a separate chamber,

461

00:30:57,000 --> 00:31:01,000

will channel into the cups, causing the wheel to spin.

462

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

Dude, it's like an 1860s circular saw.

463

00:31:03,000 --> 00:31:07,000

To keep his engine running, Tari has also rigged a hopper

464

00:31:07,000 --> 00:31:10,000

to reload the powder after each blast.

465

00:31:10,000 --> 00:31:16,000

Right now I have the black powder dispenser rigged up to the rig here,

466

00:31:16,000 --> 00:31:19,000

and I have this little piece of steel as it rotates.

467

00:31:19,000 --> 00:31:26,000

It will push the button in and releasing an amount of black powder.

468

00:31:26,000 --> 00:31:30,000

To test the wheel, Grant blasts compressed air through the system.

469

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

That worked! That looks pretty good, man.

470

00:31:32,000 --> 00:31:35,000

Yeah. How much PSI was that?

471

00:31:35,000 --> 00:31:39,000

It was just 125 PSI. Black powder is going to be tens of thousands.

472

00:31:39,000 --> 00:31:46,000

With those kinds of forces in play, they set up Tari's wheel of misfortune in the blast chamber.

473

00:31:46,000 --> 00:31:52,000

In the first test, they'll start slow, with just 15 grains of black powder per cycle.

474

00:31:52,000 --> 00:31:54,000

Initiating glow plug.

475

00:31:55,000 --> 00:32:01,000

Okay. And not enough pressure to get the wheel going.

476

00:32:01,000 --> 00:32:03,000

And even with 70 grains...

477

00:32:03,000 --> 00:32:05,000

Wow.

478

00:32:05,000 --> 00:32:09,000

...Pain's wheel of steel just ain't spinning.

479

00:32:09,000 --> 00:32:11,000

Ha ha ha ha ha ha!

480

00:32:11,000 --> 00:32:18,000

Before Tari slides into depression, he wants to improve the compression and try again.

481

00:32:18,000 --> 00:32:23,000

So the only modification that I get is I cut off this big chamber, which is way too big.

482

00:32:23,000 --> 00:32:25,000

We weren't getting the compression that we need.

483

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

I weld it on a smaller tube. Hopefully it will give us more compression.

484

00:32:29,000 --> 00:32:33,000

It's more like a shotgun. And hopefully we'll get this wheel spinning.

485

00:32:33,000 --> 00:32:37,000

Alright, here we go. In three, two, one.

486

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

This is taking too long.

487

00:32:41,000 --> 00:32:44,000

Oh! Ha ha ha ha!

488

00:32:44,000 --> 00:32:47,000

Maybe that was a little too much.

489

00:32:47,000 --> 00:32:50,000

Ha ha ha ha ha ha ha!

490

00:32:50,000 --> 00:32:55,000

Now, 70 grains wasn't too much. The whole thing backfired.

491

00:32:55,000 --> 00:33:00,000

Gasses from the explosion were forced back up into the hopper, which set off all the black powder.

492

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

And still, the wheel didn't turn.

493

00:33:03,000 --> 00:33:07,000

Oh no! Wait! Don't keep it going yet.

494

00:33:07,000 --> 00:33:12,000

They've blown the hopper off, so this experiment is pretty much over.

495

00:33:12,000 --> 00:33:18,000

Not only did it not work, now we don't have a way to continue to introduce black powder into our engine.

496

00:33:18,000 --> 00:33:27,000

Adjusting the charge and the timing might have helped, but the gravity-fed reload system looks doomed to failure every time.

497

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

Pain's instructions were followed precisely, so it's safe to say that like the other two engines that came before, it just doesn't work.

498

00:33:36,000 --> 00:33:45,000

But Grant, Carrie and Tori have one last hope. They'll put gunpowder in a lawnmower engine to see if that cuts the mustard.

499

00:33:45,000 --> 00:33:52,000

Grant's mental machinery has already been crunching the gears, pondering away of getting the black powder into the engine.

500

00:33:52,000 --> 00:33:56,000

And he's devised an ingenious fuel injection system.

501

00:33:56,000 --> 00:34:01,000

What this is is an air eraser, basically a miniature sand blaster.

502

00:34:01,000 --> 00:34:06,000

Black powder goes inside of this reservoir, and air-compressed air goes in here.

503

00:34:06,000 --> 00:34:12,000

You set this to wherever you want it to be, and a constant stream of black powder should be shooting out of here.

504

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

Out in the blast chamber, they set up for the test.

505

00:34:15,000 --> 00:34:21,000

The air eraser is rigged up to squirt the black powder directly into the combustion chamber.

506

00:34:21,000 --> 00:34:24,000

Is anybody else as excited about this as I am?

507

00:34:24,000 --> 00:34:32,000

Once again, Grant uses the drill to turn the engine over, sort of a crude version of the starter motor you'd find in your car.

508

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

Fire in the hole!

509

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

A second or two later, the fuel should kick in. In this case, the powder.

510

00:34:40,000 --> 00:34:46,000

We're anticipating a throaty throb and a nice dark puff of exhaust gas.

511

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

Well, that didn't quite work.

512

00:34:51,000 --> 00:34:55,000

And when Grant takes a peek inside the casing, he sees why.

513

00:34:55,000 --> 00:34:57,000

Is it all gooped up from the oil?

514

00:34:57,000 --> 00:35:03,000

Yeah, there's quite a bit that's actually kind of clumped in a wet puddle.

515

00:35:03,000 --> 00:35:05,000

They're left with an engine enigma.

516

00:35:05,000 --> 00:35:15,000

Our fuel needs to be dry to ignite, and as it comes up into the cylinder, the oil mixes with the black powder and makes a gooey slurry that we cannot ignite.

517

00:35:15,000 --> 00:35:25,000

They've got one last shot. They'll strip down the engine, drain all the oil, and see if the injected powder will ignite before the engine seizes up.

518

00:35:25,000 --> 00:35:28,000

There's a lot of oil in there.

519

00:35:28,000 --> 00:35:36,000

And Tori thinks their chances might be better if they replace the spark plug, which fires intermittently with this little device.

520

00:35:36,000 --> 00:35:43,000

So what I did is I made this little glow plug, and all it is is a little coil of wire. We're going to attach it to a battery.

521

00:35:43,000 --> 00:35:50,000

It'll glow red hot, and that'll be a constant source of heat to ignite the black powder every time it enters the chamber.

522

00:35:50,000 --> 00:35:52,000

He's a bright spark, isn't he?

523

00:35:52,000 --> 00:35:54,000

Right. It's the moment of truth.

524

00:35:54,000 --> 00:36:00,000

Will this four-stroke engine go on gunpowder, or is it the end of the road for this myth?

525

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

Gentlemen, start your engine.

526

00:36:05,000 --> 00:36:07,000

Glow plug.

527

00:36:09,000 --> 00:36:11,000

Black powder.

528

00:36:13,000 --> 00:36:16,000

Nothing. Zilch, zip, and bupkiss.

529

00:36:16,000 --> 00:36:23,000

In desperation, they put five grains of gunpowder directly into the cylinder and try again.

530

00:36:23,000 --> 00:36:25,000

Three, two, one.

531

00:36:28,000 --> 00:36:30,000

We've got a fire. Come on!

532

00:36:34,000 --> 00:36:37,000

You did get one push. We got one charge. We got one fire.

533

00:36:37,000 --> 00:36:39,000

Yeah, we got one ignition.

534

00:36:40,000 --> 00:36:49,000

Even a working engine won't work with gunpowder, and for that, we should probably all be grateful.

535

00:36:49,000 --> 00:36:52,000

Do we really have to talk about this one?

536

00:36:52,000 --> 00:36:58,000

No, but we will anyway. But you can see why over the ages it was so tempting to use black powder.

537

00:36:58,000 --> 00:37:01,000

It's got such high energy density, it would make a good fuel.

538

00:37:01,000 --> 00:37:06,000

But the stumbling black is getting the black powder into the piston and actually igniting it.

539

00:37:06,000 --> 00:37:08,000

Not to mention that these are dangerous.

540

00:37:08,000 --> 00:37:10,000

So you're ready to wrap this one up?

541

00:37:10,000 --> 00:37:11,000

Yep.

542

00:37:11,000 --> 00:37:12,000

Claim it.

543

00:37:12,000 --> 00:37:13,000

Busted.

544

00:37:13,000 --> 00:37:14,000

Easy. Busted.

545

00:37:14,000 --> 00:37:15,000

Busted.

546

00:37:38,000 --> 00:37:42,000

Jim and Jamie are ready to live out the ultimate boyhood dream.

547

00:37:42,000 --> 00:37:49,000

Fitting two potentially explosive air cylinders to an unsuspecting ski boat, then cutting loose.

548

00:37:52,000 --> 00:37:54,000

That's what it's going to be like.

549

00:37:54,000 --> 00:38:01,000

It's not a fully fledged myth, but after the success of an air cylinder blasting through a wall, it's impossible to resist.

550

00:38:02,000 --> 00:38:09,000

Step one is getting our stunt skipper installed in his wetsuit without having to blur some parts of your screen.

551

00:38:11,000 --> 00:38:15,000

Step two is filling the cylinders in the boat with compressed air from the truck.

552

00:38:19,000 --> 00:38:23,000

These tanks are actually filled with geese and they're complaining.

553

00:38:23,000 --> 00:38:28,000

And step three is seeing if Adam and Jamie can finally float their own boat.

554

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

The worst case scenario I have to say is that one of the tanks blows up and the shrapnel ends up ripping through Jamie's flesh and killing him.

555

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

So much for the pep talk.

556

00:38:40,000 --> 00:38:45,000

It's a good rule of thumb that support staff should be seen and not heard.

557

00:38:45,000 --> 00:38:51,000

Jamie, so when we release you, we're going to pull off to the right hand side and you're going to steer to our left.

558

00:38:51,000 --> 00:38:52,000

Okay?

559

00:38:52,000 --> 00:38:54,000

You mean I'm going to steer off to port?

560

00:38:54,000 --> 00:38:58,000

Yes, you're going to steer off to port, you old salt.

561

00:38:58,000 --> 00:39:00,000

And we'll be to the starboard.

562

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

What, left and right isn't good enough when there's water around?

563

00:39:04,000 --> 00:39:09,000

There's also plenty of spectators around, so they'll have to be careful.

564

00:39:09,000 --> 00:39:14,000

We've got a tour over here of kids in small boats.

565

00:39:14,000 --> 00:39:19,000

We're going to tell you past that tour before we release you.

566

00:39:19,000 --> 00:39:24,000

When all seems safe, the rocket boat is finally cut loose from the mothership.

567

00:39:24,000 --> 00:39:30,000

And remember, they're dealing here with twice the pressure used earlier to smash a brick wall.

568

00:39:30,000 --> 00:39:37,000

Jamie's ready and the mechanical throttle is gently nudged forward in the kick-ass direction.

569

00:39:50,000 --> 00:39:57,000

Oh dear, lots of noise and lots of spray.

570

00:39:57,000 --> 00:40:03,000

But that brief burst of speed clocked in at just over five knots on the speed gun.

571

00:40:03,000 --> 00:40:09,000

And the boat was propelled a mere 120 feet.

572

00:40:09,000 --> 00:40:12,000

Well, that was a whole lot of nothing.

573

00:40:12,000 --> 00:40:14,000

But Adam is more upbeat.

574

00:40:14,000 --> 00:40:16,000

That was excellent.

575

00:40:16,000 --> 00:40:21,000

I mean, it didn't do anything really important, but it was cool looking.

576

00:40:21,000 --> 00:40:27,000

Okay, there's no doubt we've just seen one of the best rooster tails this side of a barnyard.

577

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

But let's face facts, Jamie can probably swim faster than five knots.

578

00:40:32,000 --> 00:40:36,000

The boys have given themselves one more chance to prove the concept.

579

00:40:36,000 --> 00:40:39,000

And they're ready to float some ideas.

580

00:40:39,000 --> 00:40:44,000

We may be able to optimize this a little bit if we choke the outlet down.

581

00:40:44,000 --> 00:40:47,000

And also, we're going to try to drop it into the water a little lower.

582

00:40:47,000 --> 00:40:58,000

Because I'm not sure that physics on this, but my hunch says that the air pushing more against the water instead of against just air would give us a little more hope.

583

00:40:58,000 --> 00:41:04,000

It's a bold decision that involves a lightning pit stop and a radical refit of the outlet valves.

584

00:41:04,000 --> 00:41:10,000

The full force of all that compressed air will now be released underwater.

585

00:41:10,000 --> 00:41:15,000

Jamie is also not going to go gingerly with the throttle this time.

586

00:41:15,000 --> 00:41:19,000

He is just going to push it all the way forward on the first go.

587

00:41:19,000 --> 00:41:27,000

And just expend all the power trying to get up to speed and stay at a speed and actually travel more than, you know, 120 feet.

588

00:41:27,000 --> 00:41:31,000

Tanks are refilled and the boat's back in position.

589

00:41:31,000 --> 00:41:33,000

It's now sink or swim.

590

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

And Adam has some, well, vaguely helpful words of encouragement.

591

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

Remember Jamie, experiments like this are 90% mental.

592

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

I want you to be the boat. I want you to exist as one with the water.

593

00:41:45,000 --> 00:41:48,000

Think about the boat planning, the physics involved.

594

00:41:48,000 --> 00:41:51,000

Feel them in your body. Are you ready?

595

00:41:51,000 --> 00:41:54,000

What?

596

00:41:54,000 --> 00:41:57,000

I said just go for it.

597

00:41:57,000 --> 00:42:02,000

The rocket boat is unleashed and it anchors away.

598

00:42:08,000 --> 00:42:13,000

Ha ha ha ha ha ha ha ha ha.

599

00:42:13,000 --> 00:42:17,000

Let's assume that hysterical laughter is not a good sign.

600

00:42:17,000 --> 00:42:23,000

In fact, the boat traveled only half the distance of its first run.

601

00:42:23,000 --> 00:42:26,000

It was about the same as the other one, wasn't it?

602

00:42:26,000 --> 00:42:29,000

No, it wasn't even close.

603

00:42:29,000 --> 00:42:35,000

As for the speed gun, it was hardly worth installing the batteries.

604

00:42:35,000 --> 00:42:39,000

Well, I think that would proverbially be that.

605

00:42:39,000 --> 00:42:44,000

This lavish maritime experiment turned out to be a spectacular failure.

606

00:42:44,000 --> 00:42:48,000

Maybe it's time Jamie invested in a good, reliable outboard.

607

00:42:48,000 --> 00:42:52,000

I don't think he even made it like 60 or 70 feet that time.

608

00:42:52,000 --> 00:42:54,000

I don't know if you can calculate it in miles per hour.

609

00:42:54,000 --> 00:42:57,000

It'd be more like miles per day.

610

00:42:57,000 --> 00:43:01,000

So we have to ask ourselves, what's the wash-off?

611

00:43:01,000 --> 00:43:04,000

So Jamie, how are we going to wrap this one up? What do you call it?

612

00:43:04,000 --> 00:43:09,000

Well, we did get a tank to blow through a cinder block wall when we knocked the valve off.

613

00:43:09,000 --> 00:43:13,000

So that's confirmed. I mean, there were documented cases as well.

614

00:43:13,000 --> 00:43:20,000

And you can strap some air tanks to a boat and give it a little bit of power, but it's not that practical.

615

00:43:20,000 --> 00:43:21,000

It's not real power.

616

00:43:21,000 --> 00:43:24,000

Yeah, we need to go for the hydrogen and light it.

617

00:43:24,000 --> 00:43:27,000

It's another episode. We've got to let this one go.