WEBVTT

1
00:00:00.000 --> 00:00:00.350
Thank.

2
00:00:01.425 --> 00:00:04.345
All right, thank you, Axel. That was quite interesting.

3
00:00:04.645 --> 00:00:06.125
Uh, uh, on a personal note,

4
00:00:06.565 --> 00:00:10.525
I was at the SETP local Seattle Symposium a couple weeks

5
00:00:10.545 --> 00:00:13.525
ago, and Whisk gave an excellent presentation about their

6
00:00:13.525 --> 00:00:15.685
present, their preparations for Oshkosh,

7
00:00:16.025 --> 00:00:18.305
and there are def definitely interesting comparisons.

8
00:00:18.305 --> 00:00:20.455
And so thanks for sharing.

9
00:00:21.575 --> 00:00:24.155
All right, our next speaker is Taylor Oxford,

10
00:00:24.555 --> 00:00:26.035
a gentleman who's already spoken today.

11
00:00:26.035 --> 00:00:27.955
So you already know his, his intro.

12
00:00:28.155 --> 00:00:29.475
I guess the fun fact I'll share

13
00:00:29.475 --> 00:00:32.355
that we bonded over earlier today is we both have something

14
00:00:32.355 --> 00:00:34.235
very near and dear to us on our socks.

15
00:00:34.905 --> 00:00:37.565
I've got my cat here, Taylor's guys children,

16
00:00:39.305 --> 00:00:42.085
and that'll be helping us, uh, get all the energy we need

17
00:00:42.085 --> 00:00:43.485
to talk to you guys today.

18
00:00:50.525 --> 00:00:51.545
All right. Hello everyone.

19
00:00:51.645 --> 00:00:54.185
Um, you know, thank you for listening to me

20
00:00:54.285 --> 00:00:55.545
for a second time today.

21
00:00:55.965 --> 00:00:58.235
Uh, uh, Claude,

22
00:00:58.335 --> 00:01:01.195
I'm knocking my presentation on this one,

23
00:01:01.945 --> 00:01:05.365
but you know, today we all enjoy a nice

24
00:01:06.145 --> 00:01:07.325
big filling lunch.

25
00:01:07.585 --> 00:01:11.125
So we're kind of at that time where you need a nice

26
00:01:11.725 --> 00:01:15.735
relaxing, um, you know, topic, safety equipment.

27
00:01:15.735 --> 00:01:18.255

Everybody loves safety equipment. It's easy.

28
00:01:19.275 --> 00:01:20.535
You can kind of zone out.

29
00:01:20.715 --> 00:01:22.055
You don't have to worry about the coffee

30
00:01:22.435 --> 00:01:26.535
unless you're talking about the hazards that actually come

31
00:01:26.535 --> 00:01:27.775
with safety equipment.

32
00:01:27.955 --> 00:01:32.455
So, um, I hopefully we'll, uh, give you a couple of things

33
00:01:32.485 --> 00:01:36.175
that are going on that may spur some thoughts, uh,

34
00:01:36.175 --> 00:01:37.535
about safety equipment.

35
00:01:37.675 --> 00:01:40.215
And it's not always, you know, something

36
00:01:40.215 --> 00:01:41.855
that's gonna gonna keep you safe.

37
00:01:44.435 --> 00:01:47.815
All right, so who thinks we should have safety equipment?

38
00:01:47.815 --> 00:01:50.695
Everybody, everybody may maybe not.

39
00:01:50.955 --> 00:01:52.535
It, it's like toothpaste though.

40
00:01:53.005 --> 00:01:55.055
Nine out 10 dentists recommend it,

41
00:01:55.055 --> 00:01:57.295
but there's always that, you know, one cowboy who's like,

42
00:01:57.475 --> 00:01:58.615
we don't need this.

43
00:02:01.755 --> 00:02:03.975
All right, so we understand safety equipment.

44
00:02:04.245 --> 00:02:07.965
It's important. All right, so, uh, you know,

45
00:02:08.105 --> 00:02:10.165
why do we have safety equipment?

46
00:02:10.195 --> 00:02:13.165
It's a critical part of any test hazard analysis.

47
00:02:13.825 --> 00:02:15.805
I'm not gonna go over some of these things in detail,

48
00:02:15.865 --> 00:02:18.245
but you need it to help the people, um, make sure

49
00:02:18.245 --> 00:02:20.685
that they stay safe and via emergency.

50
00:02:21.305 --> 00:02:22.885
Uh, it's to save your asset.

51
00:02:23.665 --> 00:02:25.965
So, uh, a lot of us doing UAV things, hey,

52
00:02:25.965 --> 00:02:27.085
you may put a parachute on it

53
00:02:27.205 --> 00:02:28.365
'cause it's a multimillion dollar

54
00:02:28.415 --> 00:02:29.685

asset and you want to save it.

55
00:02:29.865 --> 00:02:32.245
You don't mind just, you know, turning into a lawn dart

56
00:02:33.595 --> 00:02:36.375
and, you know, we actually think about safety equipment

57
00:02:36.395 --> 00:02:39.415
and even when it doesn't work properly, um, I'm

58
00:02:40.015 --> 00:02:43.695
remembering a F 16 shoot failed to deploy test the lot,

59
00:02:43.805 --> 00:02:46.295
have seen the, the videos from a while ago.

60
00:02:46.875 --> 00:02:49.495
Uh, the pilot's aggressively pitch rocking as he goes

61
00:02:49.495 --> 00:02:50.815
through, goes to pull the shoot

62
00:02:51.235 --> 00:02:53.015
and all of a sudden you hear no shoot.

63
00:02:53.515 --> 00:02:56.335
Um, he's very lucky that he is able to, uh, continue pitch,

64
00:02:56.335 --> 00:02:59.765
rocking and survive before he had to actually bail out.

65
00:02:59.825 --> 00:03:02.285
But we do now consider a lot of these, Hey,

66
00:03:02.825 --> 00:03:05.325
if my safety equipment doesn't work

67
00:03:05.325 --> 00:03:09.165
because I understand it's not, uh, maybe a level A system

68
00:03:09.305 --> 00:03:11.165
or so that, how am I going

69
00:03:11.165 --> 00:03:13.485
to react if it doesn't, if it doesn't actually work?

70
00:03:16.055 --> 00:03:19.675
The thing is, what happens if the safety equipment actually

71
00:03:19.985 --> 00:03:22.975
induces an unsafe situation for you?

72
00:03:23.665 --> 00:03:27.005
Um, so the following is a series of situations to kind

73
00:03:27.005 --> 00:03:29.645
of stimulate your thoughts on the hazards that, uh,

74
00:03:29.705 --> 00:03:31.205
you may have never considered

75
00:03:31.205 --> 00:03:34.685
before, trying to remove some, uh, names

76
00:03:34.865 --> 00:03:37.965
or specifics, uh, just so that we can get

77
00:03:37.965 --> 00:03:39.205
that information out.

78
00:03:39.625 --> 00:03:42.205
But not necessarily like everybody's had

79
00:03:42.205 --> 00:03:43.645
to do pretty much here today.

80
00:03:43.645 --> 00:03:45.565
We're not gonna, uh, name names.

81
00:03:47.615 --> 00:03:49.945

Alright, so we're gonna talk a little bit about

82
00:03:50.075 --> 00:03:51.305
stall spin shoots.

83
00:03:51.365 --> 00:03:54.545
Um, you know, normally it's a multi-step process

84
00:03:54.805 --> 00:03:57.545
to arm the shoot and verify its functional

85
00:03:57.545 --> 00:03:58.825
before your test point.

86
00:03:59.285 --> 00:04:02.165
Um, thing to think about what would've happened, you know,

87
00:04:02.165 --> 00:04:03.925
if the shoot deployed on that F 16

88
00:04:04.495 --> 00:04:06.765
after like, uh, the connectors all of a sudden

89
00:04:06.785 --> 00:04:09.965
as he got back in, um, connected

90
00:04:10.145 --> 00:04:11.845
and, you know, the shoot automatically

91
00:04:12.005 --> 00:04:13.045
deployed 'cause he already pulled the handle.

92
00:04:13.105 --> 00:04:14.365
You know what, what's gonna happen?

93
00:04:14.675 --> 00:04:16.245
Luckily, he probably would've just cut

94
00:04:16.245 --> 00:04:17.325
the shoot and moved on.

95
00:04:17.705 --> 00:04:19.365
Um, but those are type of things

96
00:04:19.365 --> 00:04:21.245
that you gotta start thinking about.

97
00:04:21.825 --> 00:04:25.365
So the FAA, you guys find this so important

98
00:04:25.715 --> 00:04:29.445
that you actually talk about spin stall shoots in your FA

99
00:04:29.445 --> 00:04:31.165
order on type certification.

100
00:04:31.625 --> 00:04:35.165
Um, there are actually more words on stall

101
00:04:35.185 --> 00:04:37.965
and spin shoots in this document than there

102
00:04:37.965 --> 00:04:39.125
are on f and r testing.

103
00:04:39.625 --> 00:04:42.205
And for you guys, I know we're all data driven here.

104
00:04:42.345 --> 00:04:47.245
So that's 350 words, uh, for the shoot

105
00:04:47.425 --> 00:04:52.085
and only 316 words on functionality and reliability testing.

106
00:04:52.585 --> 00:04:55.245
Um, you got a little dig dig a little deeper.

107
00:04:55.385 --> 00:04:58.805
You, you find out that, uh, uh, they repeat the references

108
00:04:58.985 --> 00:05:02.125

to the NASA papers twice, so it kind of creeps over.

109
00:05:02.185 --> 00:05:04.285
But my, my point's still still valid.

110
00:05:04.625 --> 00:05:08.065
Um, the certification, this is one of the things that it,

111
00:05:08.065 --> 00:05:10.305
it states in there, IT certification

112
00:05:10.825 --> 00:05:14.225
branches must carefully evaluate a spin recovery system

113
00:05:14.585 --> 00:05:18.185
installation to determine if it's structural integrity,

114
00:05:18.655 --> 00:05:22.065
reliability, susceptibility to inadvertent

115
00:05:22.085 --> 00:05:25.905
or unwanted deployment or jettison and adequate

116
00:05:25.925 --> 00:05:27.745
or redundant jettison ability.

117
00:05:27.965 --> 00:05:30.305
So, but it's really important, right?

118
00:05:30.375 --> 00:05:33.065
They're putting all this information, you gotta consider

119
00:05:33.095 --> 00:05:36.315
what happens, uh, if this thing doesn't go right.

120
00:05:37.645 --> 00:05:39.185
Now, you know, how do, how do,

121
00:05:39.205 --> 00:05:40.985
how do you do this most of the time?

122
00:05:41.165 --> 00:05:45.605
Hey, OEM, go test it out. Make sure it's working.

123
00:05:45.865 --> 00:05:48.725
Go once you installing your aircraft, go perform a test.

124
00:05:49.225 --> 00:05:52.205
Uh, blow the chute, make sure everything works well.

125
00:05:52.625 --> 00:05:55.285
Uh, and you know, that should work.

126
00:05:55.315 --> 00:05:56.645
That will give you a thumbs up

127
00:05:56.645 --> 00:05:57.740
that we're, we're comfortable.

128
00:05:57.745 --> 00:06:00.725
The system works. So, you know, you go out, you're like,

129
00:06:00.725 --> 00:06:02.085
all right, I'm going on my aircraft.

130
00:06:02.175 --> 00:06:03.965
Let's go, let's get clearance from tower.

131
00:06:03.975 --> 00:06:05.165
We'll go pull the chute.

132
00:06:05.465 --> 00:06:10.245
Uh, you go on tr in down the runway, boom pops up.

133
00:06:10.305 --> 00:06:11.725
Yep, everything works great.

134
00:06:11.865 --> 00:06:13.685
All right, let's pull over the taxiway assess,

135
00:06:13.755 --> 00:06:15.525

make sure everything's fine.

136
00:06:15.715 --> 00:06:18.325
Then all of a sudden you get a call from towers like,

137
00:06:18.325 --> 00:06:19.965
Hey, you guys done yet?

138
00:06:19.965 --> 00:06:22.535
And you're like, yeah, that was kind of snippy.

139
00:06:22.675 --> 00:06:24.575
Why are you doing that? Well, thanks,

140
00:06:24.595 --> 00:06:26.495
you just spotted the entire active runway

141
00:06:26.555 --> 00:06:28.535
and we now have to close it and clear everything off.

142
00:06:29.105 --> 00:06:33.925
So it's like, huh, well, did we, did we consider that?

143
00:06:33.985 --> 00:06:37.445
Is that something that when, you know, the FA asked us to do

144
00:06:37.445 --> 00:06:38.645
that they realized we may do?

145
00:06:38.645 --> 00:06:41.965
Could we have done this in, you know, better, better ways?

146
00:06:42.305 --> 00:06:45.125
Uh, and there are things like, hey, you know,

147
00:06:45.125 --> 00:06:47.725
does one firework going off infer

148
00:06:47.725 --> 00:06:48.805
that the next one's gonna work?

149
00:06:48.905 --> 00:06:50.845
Or, you know, for me, I, I dealt

150
00:06:50.845 --> 00:06:52.445
with model rockets a lot growing up.

151
00:06:52.625 --> 00:06:55.295
Uh, does that, you know, all the time.

152
00:06:55.295 --> 00:06:58.535
They wouldn't, wouldn't go off. Like, is this gonna work?

153
00:06:58.675 --> 00:06:59.695
Is there a better way?

154
00:06:59.995 --> 00:07:02.895
So that's why I want you to kind of think about, you know,

155
00:07:02.895 --> 00:07:04.935
just the fact that I, you know,

156
00:07:04.955 --> 00:07:07.375
set off one explosive doesn't really infer

157
00:07:07.685 --> 00:07:09.295
that the next explosive

158
00:07:09.295 --> 00:07:11.695
that's installed in there is actually going to go off.

159
00:07:12.375 --> 00:07:14.255
I can, uh, do a test of the system

160
00:07:14.715 --> 00:07:16.375
and make sure that I'm getting the correct

161
00:07:16.375 --> 00:07:17.495
current coming through.

162
00:07:17.525 --> 00:07:19.175

That would set off the explosive

163
00:07:19.435 --> 00:07:22.375
and maybe that should be an appropriate test along

164
00:07:22.375 --> 00:07:25.135
with maybe a bench test or test on a truck

165
00:07:25.195 --> 00:07:28.735
or something, not an actual, uh, event on a runway.

166
00:07:32.325 --> 00:07:34.025
All right. Another fun one, hunter,

167
00:07:35.035 --> 00:07:37.315
I know you've been asking about this on the EV toll council.

168
00:07:37.495 --> 00:07:40.435
So, uh, hopefully I'll get you a little information here

169
00:07:40.435 --> 00:07:41.995
when we can have a conversation about it later.

170
00:07:42.295 --> 00:07:44.115
So, a tether restraint system.

171
00:07:44.775 --> 00:07:48.785
So got the nice, this is the Honda EV toll

172
00:07:48.805 --> 00:07:50.185
for all of you haven't seen it yet.

173
00:07:50.185 --> 00:07:52.025
The nice CGI rre reference.

174
00:07:53.975 --> 00:07:57.755
So we restrain the aircraft against flying away, right?

175
00:07:57.935 --> 00:08:01.435
Making sure that, you know, it's not uncontrollable.

176
00:08:01.495 --> 00:08:02.755
We don't lose the lost Lincoln,

177
00:08:02.775 --> 00:08:05.235
it just goes flying off into the national airspace.

178
00:08:05.855 --> 00:08:07.275
Um, and we're also doing it

179
00:08:07.275 --> 00:08:08.755
to prevent it from damaging itself.

180
00:08:09.055 --> 00:08:12.995
Um, again, control all these, the vehicles are very complex

181
00:08:13.055 --> 00:08:14.315
and inherently unstable.

182
00:08:14.775 --> 00:08:15.915
Um, so it going

183
00:08:15.935 --> 00:08:18.915
and tilting one side, the other could, uh,

184
00:08:18.915 --> 00:08:20.875
really damage the product that we have.

185
00:08:21.415 --> 00:08:26.355
Um, but, you know, maybe we look at that, maybe we don't.

186
00:08:26.805 --> 00:08:28.835
Maybe we start with something smaller.

187
00:08:29.135 --> 00:08:30.395
So, uh, starting

188
00:08:30.395 --> 00:08:32.715
with a smaller vehicle instead of a full scale.

189
00:08:32.735 --> 00:08:35.275

That's, that's all right, sounds good to us. Let's do that.

190
00:08:37.035 --> 00:08:39.295
So like good engineers, we do a lot of analysis.

191
00:08:39.555 --> 00:08:40.855
All right, so what's it gonna take?

192
00:08:40.965 --> 00:08:43.695
What size tethers do we have to do in order

193
00:08:43.695 --> 00:08:47.535
to keep this vehicle, um, from striking a wing tip or nose

194
00:08:47.555 --> 00:08:49.015
or putting the boom into the ground?

195
00:08:49.725 --> 00:08:52.295
Well, pretty small.

196
00:08:53.115 --> 00:08:55.240
So now you start to think about it, it's like, like, oh,

197
00:08:55.240 --> 00:08:57.205
we're using this to keep the vehicle safe,

198
00:08:57.505 --> 00:09:00.005
but it's actually fairly restraining.

199
00:09:00.265 --> 00:09:04.045
So, uh, we go in, we're just trying to get testing going.

200
00:09:04.065 --> 00:09:06.045
We wanna just get the vehicle off the ground, right?

201
00:09:06.225 --> 00:09:08.485
That's the first step. Just get the vehicle off the ground,

202
00:09:08.535 --> 00:09:09.605
bring it right back down.

203
00:09:09.705 --> 00:09:11.285
We understand that there are limitations

204
00:09:11.285 --> 00:09:12.445
with this system involved.

205
00:09:13.065 --> 00:09:17.125
So what do we do? All right, get off the ground. Okay?

206
00:09:17.305 --> 00:09:20.925
All of a sudden, ah, tether catches, starts leaning,

207
00:09:20.955 --> 00:09:22.085
wing leaning, oh,

208
00:09:22.085 --> 00:09:25.845
other tether catches immediately kill the vehicle lands.

209
00:09:25.845 --> 00:09:28.405
Luckily it's very close to the ground so no one do damage,

210
00:09:28.585 --> 00:09:32.825
but you know, it, we didn't actually accomplish much

211
00:09:33.245 --> 00:09:35.305
and it become incredibly restraining.

212
00:09:35.565 --> 00:09:37.665
And the fact that one tether catching

213
00:09:38.225 --> 00:09:40.625
actually caused the vehicle to jerk rapidly to the side.

214
00:09:40.885 --> 00:09:43.265
So, you know, we come to the conclusion that a,

215
00:09:43.265 --> 00:09:46.465
this is not a configuration that we can really go forward

216
00:09:46.465 --> 00:09:47.465

and progress with testing.

217
00:09:47.565 --> 00:09:50.825
So let's move on to the next, uh, set of testing.

218
00:09:51.205 --> 00:09:55.465
So, uh, we go, we reconfigure to a different configuration.

219
00:09:55.465 --> 00:09:57.865
This is a single tether. Uh, we get prepared.

220
00:09:57.985 --> 00:09:59.505
I go put it on a new pair of pants

221
00:09:59.675 --> 00:10:01.345
after the incident with the last one.

222
00:10:01.685 --> 00:10:03.345
Um, and we start to think about things.

223
00:10:03.565 --> 00:10:05.345
Now we've got this configuration

224
00:10:05.345 --> 00:10:06.945
with the single tether, but we're learning.

225
00:10:06.955 --> 00:10:09.385
We're like, alright, the skids, we've noticed

226
00:10:09.385 --> 00:10:11.665
that the vehicle kind of slides a little bit around

227
00:10:11.725 --> 00:10:12.945
before we get off the ground

228
00:10:12.945 --> 00:10:14.705
because all the different pro uh,

229
00:10:14.705 --> 00:10:15.985
propellers rotating around.

230
00:10:16.325 --> 00:10:19.425
Um, and we've got this big metal eye hook

231
00:10:19.425 --> 00:10:21.905
that's bolted into the ground that the tethers attached to.

232
00:10:22.335 --> 00:10:24.145
Alright, smart. Let's think about this.

233
00:10:24.605 --> 00:10:28.865
If we go and we slide into this, we're gonna actually kind

234
00:10:28.865 --> 00:10:30.745
of roll the vehicle over, which we don't want to happen.

235
00:10:30.885 --> 00:10:31.945
So let's be smart.

236
00:10:33.015 --> 00:10:34.525
We're gonna attach it right in the middle

237
00:10:34.525 --> 00:10:35.885
between the two skids.

238
00:10:35.905 --> 00:10:38.725
So in the event that it does slide, it's, you know,

239
00:10:38.725 --> 00:10:41.925
impacting the, the inside of the skid should help us train

240
00:10:42.065 --> 00:10:44.165
or restrain it, you know, from tipping over.

241
00:10:44.195 --> 00:10:45.845
It's like, all right, that makes a lot of sense.

242
00:10:46.975 --> 00:10:48.115
Of course, what happens?

243
00:10:48.375 --> 00:10:50.235

Pilots become creative at this point.

244
00:10:50.695 --> 00:10:53.355
The pilot actually got off the ground just enough

245
00:10:53.355 --> 00:10:56.595
to slide gently over the islet, come back down

246
00:10:56.615 --> 00:10:59.915
and slide right back into it on the outside just as we, uh,

247
00:11:00.095 --> 00:11:01.315
you know, didn't want to happen.

248
00:11:01.535 --> 00:11:03.865
So, you know, it becomes

249
00:11:04.625 --> 00:11:07.545
increasingly difficult when you start talking about

250
00:11:07.555 --> 00:11:08.905
these type of systems.

251
00:11:09.645 --> 00:11:12.385
Um, they're supposed to help you to be safe,

252
00:11:12.565 --> 00:11:15.715
to really actually keep you safe without, um,

253
00:11:15.815 --> 00:11:18.635
the additional hazards and things that come along with it.

254
00:11:18.975 --> 00:11:22.705
Uh, the, we continue to do a lot of other, uh, testing

255
00:11:22.805 --> 00:11:25.185
and this configuration because that's the buildup.

256
00:11:25.185 --> 00:11:27.705
We've gotta go and make sure this is safe.

257
00:11:28.005 --> 00:11:29.225
The control law is working.

258
00:11:29.725 --> 00:11:32.905
Um, it's not, uh, a catastrophic type of event

259
00:11:33.365 --> 00:11:35.745
before we really, uh, move on

260
00:11:35.765 --> 00:11:37.345
to any type of untethered testing.

261
00:11:37.485 --> 00:11:41.995
But that's, you know, not necessarily maybe the best way.

262
00:11:42.175 --> 00:11:45.315
The the pilot, you know, one thing that he really noticed is

263
00:11:45.315 --> 00:11:48.035
that, um, you know, it's, it's,

264
00:11:48.055 --> 00:11:49.795
if it's too short, I can't control it.

265
00:11:49.865 --> 00:11:52.915
Even with having that much longer tether that's just,

266
00:11:53.000 --> 00:11:57.535
just a single, it's always in his mind that if I get

267
00:11:57.535 --> 00:11:59.575
to the end of this, I don't know necessarily

268
00:11:59.715 --> 00:12:01.375
how the vehicle is going to react.

269
00:12:01.815 --> 00:12:04.255
I don't know if it's all gonna flip over.

270
00:12:04.395 --> 00:12:06.535

We had specific knock it off calls.

271
00:12:06.835 --> 00:12:09.895
If, you know, you got to the, the pink line on the tether,

272
00:12:09.895 --> 00:12:11.255
you saw that lift off the ground,

273
00:12:11.255 --> 00:12:12.695
then hey, let's knock it off.

274
00:12:12.695 --> 00:12:15.415
Let's bring it down. But even knowing

275
00:12:15.415 --> 00:12:19.135
that the pilot still was concerned repeatedly that, hey,

276
00:12:19.285 --> 00:12:21.335
this isn't gonna work necessarily.

277
00:12:24.265 --> 00:12:28.585
Uh, so again, we moved to a different configuration,

278
00:12:29.335 --> 00:12:31.035
but maybe that's not the best thing.

279
00:12:31.095 --> 00:12:34.275
So, uh, you know, we struck the hole down anyway.

280
00:12:35.025 --> 00:12:36.325
Now all are alternatives.

281
00:12:36.345 --> 00:12:39.285
So this is, uh, for those in the e to space,

282
00:12:39.435 --> 00:12:41.805
this is SkyDrive a company out of Japan.

283
00:12:42.265 --> 00:12:43.525
I'm happen to know one of the,

284
00:12:43.545 --> 00:12:44.845
the guys that was in this picture.

285
00:12:45.025 --> 00:12:46.085
So he pointed me to this.

286
00:12:46.485 --> 00:12:47.885
I just wanna point to the, uh,

287
00:12:48.435 --> 00:12:50.605
skid configuration for this vehicle.

288
00:12:51.025 --> 00:12:54.845
So instead of going to a tether, they actually have a large

289
00:12:55.355 --> 00:12:57.805
skid system that extends out beyond

290
00:12:58.425 --> 00:12:59.605
the sides of the aircraft.

291
00:12:59.825 --> 00:13:01.045
And this has better thinking.

292
00:13:01.245 --> 00:13:04.645
'cause we had initially gone into testing, assuming one,

293
00:13:04.665 --> 00:13:07.445
the vehicle was either extremely uncontrollable

294
00:13:07.705 --> 00:13:10.405
or two, it was gonna be just rock solid, which of course,

295
00:13:10.605 --> 00:13:11.685
neither one was true.

296
00:13:11.785 --> 00:13:14.205
It was kind of in the middle. And this retrain

297
00:13:14.205 --> 00:13:15.525

system might have been a little better.

298
00:13:15.585 --> 00:13:17.725
It could have touched on the, the skids

299
00:13:17.725 --> 00:13:19.205
and kind of helped ride itself.

300
00:13:19.305 --> 00:13:22.205
So, you know, there are always alternatives

301
00:13:22.205 --> 00:13:24.805
that you can kind of think of that may, may help,

302
00:13:24.805 --> 00:13:27.285
that may be a better situation, um,

303
00:13:27.505 --> 00:13:31.645
if you really are considering the hazards that go along, uh,

304
00:13:32.115 --> 00:13:34.405
with your specific safety equipment.

305
00:13:36.355 --> 00:13:39.885
All right, so who uses a fire suppression system?

306
00:13:40.445 --> 00:13:41.525
I know a lot of people do.

307
00:13:41.745 --> 00:13:45.645
So, um, they're there to save the crew in the event

308
00:13:45.645 --> 00:13:49.285
of a catastrophic fire typically incurred from a crash.

309
00:13:50.855 --> 00:13:54.315
Now, I will say these systems are amazing.

310
00:13:54.615 --> 00:13:55.875
If you don't have one

311
00:13:55.975 --> 00:13:58.995
and you're doing any testing, like field performance

312
00:13:59.095 --> 00:14:01.595
or anything where you're close to the ground where, uh,

313
00:14:01.695 --> 00:14:06.025
you could, you know, end up in accident, you need one

314
00:14:06.025 --> 00:14:09.175
of these types of systems to help the people on

315
00:14:09.175 --> 00:14:10.695
board survive.

316
00:14:11.355 --> 00:14:13.335
I'm a big, big fan of these,

317
00:14:13.755 --> 00:14:17.145
but there's dumb things that you have to uh,

318
00:14:17.625 --> 00:14:18.665
consider with that.

319
00:14:18.965 --> 00:14:22.825
So just gonna say, I, uh,

320
00:14:23.195 --> 00:14:26.135
we've got a quick clip for you to go over.

321
00:14:26.315 --> 00:14:29.415
Um, I may live in California,

322
00:14:29.555 --> 00:14:33.495
but I don't have a Hollywood budget, so please, uh,

323
00:14:33.725 --> 00:14:35.015
forgive me for the quality.

324
00:14:35.395 --> 00:14:37.505

But I hope, uh, it helps to,

325
00:14:37.645 --> 00:14:39.465
and, you know, kind of inspire you guys

326
00:14:39.725 --> 00:14:42.225
and get you thinking about some things that could happen.

327
00:14:47.055 --> 00:14:51.645
We find our test crew awake early one morning in the midst

328
00:14:51.745 --> 00:14:53.525
of field performance testing,

329
00:14:58.045 --> 00:15:00.495
Another successful test point.

330
00:15:01.195 --> 00:15:04.655
Yep. All of that good data is keeping the engineers

331
00:15:04.655 --> 00:15:05.695
and TM quiet.

332
00:15:07.795 --> 00:15:10.885
Okay, let's run through all of our safety checks

333
00:15:11.065 --> 00:15:14.725
as we taxi back to the end of the runway.

334
00:15:17.915 --> 00:15:19.555
Everyone is strapped in

335
00:15:20.245 --> 00:15:23.745
by your suppression is on in an active mode,

336
00:15:24.285 --> 00:15:26.175
Same as it's been all morning.

337
00:15:28.925 --> 00:15:31.145
And onto test card five alpha.

338
00:15:31.685 --> 00:15:33.705
Hey, do you guys smell something?

339
00:15:36.055 --> 00:15:39.345
Well, you did have that breakfast burrito from the sketchy

340
00:15:39.345 --> 00:15:40.545
food truck this morning.

341
00:15:42.735 --> 00:15:46.935
It is sitting pretty heavy. No, it smells like plastic.

342
00:15:48.315 --> 00:15:48.535
Ah,

343
00:15:53.845 --> 00:15:54.065
ah,

344
00:16:03.825 --> 00:16:06.995
ah, ah,

345
00:16:09.915 --> 00:16:10.915
Alright. Uh,

346
00:16:10.915 --> 00:16:12.165
I hope you enjoyed that.

347
00:16:12.225 --> 00:16:14.805
Um, actually, I don't care if you enjoyed it or not.

348
00:16:15.025 --> 00:16:19.605
Um, Uh, I enjoyed having that and making it with my kids.

349
00:16:19.785 --> 00:16:21.725
It, you know, makes it a little easier to come

350
00:16:21.725 --> 00:16:22.885
to these when you involve them.

351
00:16:23.065 --> 00:16:25.325

But just to talk about this, you know,

352
00:16:25.575 --> 00:16:27.445
could this type of thing happen?

353
00:16:28.025 --> 00:16:32.045
So, you know, a failure of imagination, maybe that, uh,

354
00:16:32.065 --> 00:16:35.285
we didn't consider the possibility that maybe

355
00:16:35.845 --> 00:16:39.445
a system designed, you know, to save people in the event

356
00:16:39.465 --> 00:16:42.565
of a catastrophic fire could be inadvertently set off

357
00:16:42.625 --> 00:16:45.445
by a flame the size of a candle, um,

358
00:16:45.905 --> 00:16:47.365
and really put people in danger.

359
00:16:47.665 --> 00:16:51.085
So if this type of thing happens while, you know,

360
00:16:51.545 --> 00:16:54.325
you're actually airborne or in the midst of a test point

361
00:16:54.385 --> 00:16:55.845
and you're not expecting it,

362
00:16:56.515 --> 00:16:58.165
that could have turned out really bad.

363
00:16:58.355 --> 00:17:02.275
This just theoretical situation happened while they were,

364
00:17:02.295 --> 00:17:03.355
uh, taxing around.

365
00:17:03.695 --> 00:17:07.405
So we have the tools

366
00:17:07.465 --> 00:17:11.085
to analyze this level of complex situation.

367
00:17:11.585 --> 00:17:13.805
Um, if for all the, you guys who, uh,

368
00:17:13.905 --> 00:17:16.885
and gals who are a fan of STPA

369
00:17:16.885 --> 00:17:19.125
or stamp, this type of

370
00:17:19.765 --> 00:17:23.245
analysis probably would've been good when the initial, uh,

371
00:17:24.215 --> 00:17:27.185
fire suppression system was designed to help kind

372
00:17:27.185 --> 00:17:28.385
of weed out some of these things

373
00:17:28.385 --> 00:17:31.585
because it's a higher complexity system, um,

374
00:17:31.615 --> 00:17:34.225
than maybe just their standard TD risk

375
00:17:34.225 --> 00:17:35.905
matrix, uh, would've involved.

376
00:17:38.905 --> 00:17:43.845
So conclusions, we are typically good at addressing hazards

377
00:17:43.995 --> 00:17:45.885
with safety equipment and mitigations.

378
00:17:46.075 --> 00:17:48.525

It's what we do. It's what we do all the time.

379
00:17:48.665 --> 00:17:50.205
How are, are we gonna keep people safe?

380
00:17:50.795 --> 00:17:52.465
We're gonna make sure they have this equipment

381
00:17:52.465 --> 00:17:53.505
so we can keep 'em safe.

382
00:17:54.645 --> 00:17:56.135
Sometimes we even do it

383
00:17:56.235 --> 00:17:58.535
and think about what happens if the equipment

384
00:17:58.645 --> 00:18:00.975
doesn't actually keep us safe.

385
00:18:01.045 --> 00:18:03.775
It's not functioning. Alright, so we go

386
00:18:03.775 --> 00:18:04.895
through, all right, that didn't work.

387
00:18:04.915 --> 00:18:06.775
All right, we're gonna have to ditch, you know,

388
00:18:06.775 --> 00:18:07.815
that, that type of thing.

389
00:18:09.785 --> 00:18:13.155
What we really need to work on, I think, is

390
00:18:14.335 --> 00:18:19.205
spend time thinking about how this could go wrong, right?

391
00:18:19.295 --> 00:18:23.325
These systems that we're designing may not have the same

392
00:18:23.685 --> 00:18:28.605
pedigree as, you know, other systems onboard your airplane.

393
00:18:28.605 --> 00:18:31.005
They not, not have spent like thousands

394
00:18:31.005 --> 00:18:34.925
of hours in the sill like your, uh, flight control software.

395
00:18:34.955 --> 00:18:37.885
They could have just been what some people came up in the

396
00:18:37.885 --> 00:18:39.845
lab and said, Hey, this is gonna work for you.

397
00:18:40.385 --> 00:18:42.925
Um, so it's really important that we start to think about

398
00:18:43.565 --> 00:18:47.365
Antivert operations when we're adding a system, uh,

399
00:18:47.785 --> 00:18:49.765
for safety to the aircraft.

400
00:18:49.945 --> 00:18:52.285
Um, it's something as simple as, uh,

401
00:18:52.285 --> 00:18:55.605
we were talking at lunch about, uh, wearing parachutes in a,

402
00:18:55.905 --> 00:18:58.765
um, commercial aircraft, you know, with seats

403
00:18:58.765 --> 00:19:00.965
that aren't necessarily designed to handle that like some

404
00:19:00.965 --> 00:19:02.445
of the military guys, you know,

405
00:19:02.545 --> 00:19:05.365

and that can naturally be fatiguing on you

406
00:19:05.525 --> 00:19:08.165
because this, you're putting it into a system

407
00:19:08.705 --> 00:19:10.925
or a situation that wasn't actually designed.

408
00:19:11.505 --> 00:19:13.445
So you can get unintended oppor

409
00:19:13.465 --> 00:19:16.885
or results if you're not really, uh, paying attention.

410
00:19:18.495 --> 00:19:20.795
So with that, you know, I just thank everybody

411
00:19:20.815 --> 00:19:22.035
for listening.

412
00:19:22.075 --> 00:19:25.275
I hope you, uh, did enjoy, uh, the movie

413
00:19:25.275 --> 00:19:26.475
that I made with my kids.

414
00:19:26.615 --> 00:19:30.115
So, uh, feel free. I'm now opening up to any questions.

415
00:19:45.845 --> 00:19:49.445
All right. So no questions. Wow. All right.

416
00:19:49.495 --> 00:19:51.005
Twice I get it away.

417
00:19:51.665 --> 00:19:56.345
All right, thanks.

418
00:19:56.475 --> 00:20:00.815
Thank very much. All right, you guys better.