
NASA
SPACESTATION
LIVE

1
00:00:09,190 --> 00:00:07,510
the international space station is home

2
00:00:11,110 --> 00:00:09,200
to scientific research in many

3
00:00:13,430 --> 00:00:11,120
disciplines which is being conducted by

4
00:00:15,669 --> 00:00:13,440
many researchers from academics as well

5
00:00:17,990 --> 00:00:15,679
as the business sector for example

6
00:00:21,109 --> 00:00:18,000
recently the station crew members worked

7
00:00:22,630 --> 00:00:21,119
on a combustion experiment called bass m

8
00:00:25,509 --> 00:00:22,640
the best part is for burning and

9
00:00:27,189 --> 00:00:25,519
suppressions of solids and the m is from

10
00:00:29,189 --> 00:00:27,199
milken the international chemical and

11
00:00:30,790 --> 00:00:29,199
textile company which has a clear

12
00:00:33,030 --> 00:00:30,800
interest in learning more about why

13
00:00:35,430 --> 00:00:33,040

things burn as they do recently my

14
00:00:37,990 --> 00:00:35,440
colleague brandy dean spoke with chris

15
00:00:39,750 --> 00:00:38,000
de soyza the vice president of millikin

16
00:00:41,030 --> 00:00:39,760
research and asked him what they hoped

17
00:00:42,709 --> 00:00:41,040
to learn about combustion and

18
00:00:46,470 --> 00:00:42,719
weightlessness that they couldn't learn

19
00:00:49,510 --> 00:00:47,350
you know that's a that's a great

20
00:00:51,189 --> 00:00:49,520
question i actually had several people

21
00:00:52,389 --> 00:00:51,199
uh here at milliken ask us well why are

22
00:00:55,189 --> 00:00:52,399
you interested in doing that what can

23
00:00:57,910 --> 00:00:55,199
you learn uh interestingly enough things

24
00:01:00,310 --> 00:00:57,920
are are so different in terms of zero

25
00:01:02,229 --> 00:01:00,320
gravity versus non-zero gravity there

26
00:01:05,670 --> 00:01:02,239
are some key aspects

27
00:01:07,429 --> 00:01:05,680
of burning that you can't really get

28
00:01:09,910 --> 00:01:07,439
unless you're in zero gravity things

29
00:01:12,390 --> 00:01:09,920
like the air convection effect and air

30
00:01:15,670 --> 00:01:12,400
buoyancy and those two things

31
00:01:17,350 --> 00:01:15,680
actually affect some key parameters one

32
00:01:19,749 --> 00:01:17,360
the ultimately what is the temperature

33
00:01:22,149 --> 00:01:19,759
of the flame that's burning

34
00:01:24,789 --> 00:01:22,159
second what is the spread rate or the

35
00:01:26,469 --> 00:01:24,799
rate at which the fire is moving along

36
00:01:28,390 --> 00:01:26,479
the fabric and then third it can

37
00:01:30,230 --> 00:01:28,400
actually affect the combustion products

38
00:01:32,230 --> 00:01:30,240

so if you can affect

39
00:01:34,069 --> 00:01:32,240
those parameters or understand those

40
00:01:35,910 --> 00:01:34,079
parameters you can get some insights

41
00:01:38,310 --> 00:01:35,920
into things

42
00:01:39,910 --> 00:01:38,320
about the burning process or inhibiting

43
00:01:41,749 --> 00:01:39,920
the burn process that you really

44
00:01:43,670 --> 00:01:41,759
couldn't get in gravity and in fact

45
00:01:45,670 --> 00:01:43,680
what's what's most important probably is

46
00:01:47,590 --> 00:01:45,680
we ran the experiments both

47
00:01:49,350 --> 00:01:47,600
here on earth exactly the same as the

48
00:01:52,069 --> 00:01:49,360
ones we did in space

49
00:01:53,590 --> 00:01:52,079
and therefore the delta between the two

50
00:01:55,510 --> 00:01:53,600
actually gives us a lot of insights into

51
00:01:57,670 --> 00:01:55,520
that and it's it's pretty important for

52
00:01:58,630 --> 00:01:57,680
us to understand that so what did you

53
00:01:59,910 --> 00:01:58,640
think to try and do this on the

54
00:02:01,749 --> 00:01:59,920
international space station then how did

55
00:02:04,230 --> 00:02:01,759
you get set up with that that's actually

56
00:02:06,709 --> 00:02:04,240
a very interesting story um

57
00:02:09,270 --> 00:02:06,719
we have a place here called the gibbs

58
00:02:10,869 --> 00:02:09,280
cancer center and research institute and

59
00:02:12,550 --> 00:02:10,879
one of the gentlemen that's over that is

60
00:02:15,830 --> 00:02:12,560
dr tim eatman

61
00:02:18,229 --> 00:02:15,840
and dr eatman also was the interim chief

62
00:02:20,390 --> 00:02:18,239
scientist at cases

63
00:02:22,790 --> 00:02:20,400

several years ago

64
00:02:24,869 --> 00:02:22,800
dr eatman is a friend of one of the

65
00:02:26,949 --> 00:02:24,879
executives at milliken and always was

66
00:02:28,150 --> 00:02:26,959
interested in milliken and gave me a

67
00:02:29,670 --> 00:02:28,160
call one day and said hey i'd love to

68
00:02:31,509 --> 00:02:29,680
come tour your place

69
00:02:32,949 --> 00:02:31,519
after touring and us talking he looked

70
00:02:35,270 --> 00:02:32,959
at me and said you know what i was

71
00:02:36,309 --> 00:02:35,280
associated with cases and

72
00:02:37,750 --> 00:02:36,319
i think this would be something

73
00:02:40,790 --> 00:02:37,760
interesting

74
00:02:42,150 --> 00:02:40,800
for for you to consider and we spent a

75
00:02:43,830 --> 00:02:42,160
day and a half

76
00:02:45,910 --> 00:02:43,840
covering a lot of deep science and it

77
00:02:48,869 --> 00:02:45,920
became very clear to us

78
00:02:51,350 --> 00:02:48,879
that you know nasa and cases were doing

79
00:02:53,430 --> 00:02:51,360
a lot more than just you know rocket

80
00:02:54,949 --> 00:02:53,440
research they understood a lot about

81
00:02:57,750 --> 00:02:54,959
things that that were very interesting

82
00:03:00,309 --> 00:02:57,760
to us subsequently we took our leader of

83
00:03:01,990 --> 00:03:00,319
our fr technology area which fr stands

84
00:03:04,229 --> 00:03:02,000
for fire retardancy

85
00:03:05,589 --> 00:03:04,239
and had him go up to the glenn research

86
00:03:08,309 --> 00:03:05,599
center

87
00:03:10,309 --> 00:03:08,319
and as the story goes really really

88
00:03:11,670 --> 00:03:10,319

quickly after that it became clear that

89
00:03:13,110 --> 00:03:11,680
there were some opportunities we could

90
00:03:16,070 --> 00:03:13,120
do

91
00:03:16,790 --> 00:03:16,080
on the space station that would allow us

92
00:03:18,949 --> 00:03:16,800
to

93
00:03:20,949 --> 00:03:18,959
get possibly some unique insights that

94
00:03:22,630 --> 00:03:20,959
we couldn't get any other way

95
00:03:26,550 --> 00:03:22,640
well so tell us a little bit about the

96
00:03:27,350 --> 00:03:26,560
experiment itself what does basm do

97
00:03:28,470 --> 00:03:27,360
so

98
00:03:32,229 --> 00:03:28,480
one of the things that was important to

99
00:03:34,550 --> 00:03:32,239
us was to design an experiment that was

100
00:03:35,509 --> 00:03:34,560
extremely repeatable and what was nice

101
00:03:39,670 --> 00:03:35,519
is

102
00:03:42,949 --> 00:03:39,680
some other things that actually allowed

103
00:03:46,070 --> 00:03:42,959
us to do that and the whole idea here

104
00:03:48,149 --> 00:03:46,080
was let's set up a set of samples that

105
00:03:51,750 --> 00:03:48,159
are all exactly the same in terms of

106
00:03:53,589 --> 00:03:51,760
their size and let's vary the

107
00:03:55,990 --> 00:03:53,599
technologies that we use in terms of

108
00:03:57,589 --> 00:03:56,000
fire retardancy the way we apply that

109
00:03:59,990 --> 00:03:57,599
fire retardancy

110
00:04:03,030 --> 00:04:00,000
and then on various different types of

111
00:04:04,949 --> 00:04:03,040
fabrics and the objective was let's run

112
00:04:07,190 --> 00:04:04,959
all those experiments on the same

113
00:04:08,949 --> 00:04:07,200

equipment here on earth and get all of

114
00:04:11,670 --> 00:04:08,959
our parameters let's run all those same

115
00:04:13,830 --> 00:04:11,680
experiments on iss and the idea there

116
00:04:15,030 --> 00:04:13,840
was it's going to allow us to do a

117
00:04:16,310 --> 00:04:15,040
couple things

118
00:04:19,030 --> 00:04:16,320
one

119
00:04:21,349 --> 00:04:19,040
there was a question mark on whether

120
00:04:23,670 --> 00:04:21,359
things that could actually burn

121
00:04:25,270 --> 00:04:23,680
if fire retardants

122
00:04:27,430 --> 00:04:25,280
would actually cause them to be fire

123
00:04:29,510 --> 00:04:27,440
retardant in zero g

124
00:04:32,070 --> 00:04:29,520
so that was one of our things the other

125
00:04:35,189 --> 00:04:32,080
was airflow

126
00:04:37,030 --> 00:04:35,199
can you do something with airflow

127
00:04:38,950 --> 00:04:37,040
that

128
00:04:40,629 --> 00:04:38,960
lets you control

129
00:04:42,870 --> 00:04:40,639
all of those parameters that deal with

130
00:04:46,790 --> 00:04:42,880
things like buoyancy and conviction that

131
00:04:51,830 --> 00:04:48,150
get

132
00:04:54,070 --> 00:04:51,840
information about things like

133
00:04:55,270 --> 00:04:54,080
what causes the propagation what

134
00:04:57,270 --> 00:04:55,280
interrupts

135
00:04:59,670 --> 00:04:57,280
burn

136
00:05:01,909 --> 00:04:59,680
does different air flows

137
00:05:03,909 --> 00:05:01,919
that are interrupted differently cause

138
00:05:05,670 --> 00:05:03,919

different things to burn differently and

139
00:05:06,710 --> 00:05:05,680
one of our key areas

140
00:05:09,510 --> 00:05:06,720
for us

141
00:05:10,790 --> 00:05:09,520
that is a very very difficult area is in

142
00:05:11,510 --> 00:05:10,800
synthetics

143
00:05:14,230 --> 00:05:11,520
so

144
00:05:15,510 --> 00:05:14,240
many people are familiar with 100 cotton

145
00:05:17,029 --> 00:05:15,520
pretty common

146
00:05:18,710 --> 00:05:17,039
but one of the things about fire

147
00:05:20,629 --> 00:05:18,720
retardancy is

148
00:05:22,710 --> 00:05:20,639
you you can't be protected if you don't

149
00:05:26,310 --> 00:05:22,720
want to wear the garments

150
00:05:28,070 --> 00:05:26,320
and what we learned was having

151
00:05:29,749 --> 00:05:28,080
great performance

152
00:05:32,870 --> 00:05:29,759
great durability

153
00:05:34,469 --> 00:05:32,880
wasn't worth it if it wasn't comfortable

154
00:05:36,629 --> 00:05:34,479
and we have a lot of history here at

155
00:05:38,950 --> 00:05:36,639
millikin with how to take synthetic

156
00:05:40,870 --> 00:05:38,960
materials and make them

157
00:05:42,870 --> 00:05:40,880
have all the right moisture management

158
00:05:44,870 --> 00:05:42,880
properties all of that but unfortunately

159
00:05:46,070 --> 00:05:44,880
synthetic materials are very very

160
00:05:47,029 --> 00:05:46,080
difficult

161
00:05:48,550 --> 00:05:47,039
to

162
00:05:51,270 --> 00:05:48,560
make fire retardant

163
00:05:54,310 --> 00:05:51,280

so one of our key objectives

164
00:05:56,070 --> 00:05:54,320
with the experimentation was to vary the

165
00:05:58,230 --> 00:05:56,080
synthetic content

166
00:05:59,749 --> 00:05:58,240
in a variety of these samples

167
00:06:01,909 --> 00:05:59,759
and see if

168
00:06:04,790 --> 00:06:01,919
through this controlled process

169
00:06:07,430 --> 00:06:04,800
of air flow and also in xero g we could

170
00:06:08,790 --> 00:06:07,440
get some insights on a maybe a molecular

171
00:06:11,029 --> 00:06:08,800
level

172
00:06:13,510 --> 00:06:11,039
on ways in which we could

173
00:06:14,550 --> 00:06:13,520
get a breakthrough in synthetics because

174
00:06:15,990 --> 00:06:14,560
if we could get a breakthrough in

175
00:06:18,230 --> 00:06:16,000
synthetics

176
00:06:20,629 --> 00:06:18,240
you could now create probably the most

177
00:06:22,150 --> 00:06:20,639
durable product from an fr standpoint

178
00:06:24,230 --> 00:06:22,160
anybody's ever seen

179
00:06:25,909 --> 00:06:24,240
and get all those comfort features like

180
00:06:27,990 --> 00:06:25,919
you see you know

181
00:06:30,629 --> 00:06:28,000
all the football players and baseball

182
00:06:31,909 --> 00:06:30,639
players and all the runners talk about

183
00:06:33,990 --> 00:06:31,919
you know it used to be they wore cotton

184
00:06:35,590 --> 00:06:34,000
today they're wearing highly engineered

185
00:06:36,629 --> 00:06:35,600
synthetics because they're very

186
00:06:39,029 --> 00:06:36,639
comfortable

187
00:06:40,870 --> 00:06:39,039
and if we can do that with fr you've now

188
00:06:42,870 --> 00:06:40,880

got all the people in the military

189
00:06:44,550 --> 00:06:42,880
industrial work that want to wear their

190
00:06:46,790 --> 00:06:44,560
protective clothing which is really

191
00:06:49,110 --> 00:06:46,800
really important and and

192
00:06:50,550 --> 00:06:49,120
these experiments were one that we

193
00:06:52,950 --> 00:06:50,560
thought would give us

194
00:06:55,430 --> 00:06:52,960
insights into the synthetics

195
00:06:57,749 --> 00:06:55,440
that we couldn't get another way

196
00:07:00,950 --> 00:06:57,759
so the the point here is you i'm

197
00:07:03,670 --> 00:07:00,960
guessing sent some samples of these um

198
00:07:04,950 --> 00:07:03,680
up to to test on is that right well yeah

199
00:07:07,909 --> 00:07:04,960
we sent uh

200
00:07:10,230 --> 00:07:07,919
uh a lot of samples they were all about

201
00:07:12,950 --> 00:07:10,240
100 millimeters long

202
00:07:15,350 --> 00:07:12,960
and about uh i don't know 25 30

203
00:07:17,749 --> 00:07:15,360
millimeters wide and they're all exactly

204
00:07:20,230 --> 00:07:17,759
the same in other words they all started

205
00:07:22,390 --> 00:07:20,240
with an ignition a control something

206
00:07:24,790 --> 00:07:22,400
that you knew would burn

207
00:07:26,629 --> 00:07:24,800
and it was attached to the material that

208
00:07:29,350 --> 00:07:26,639
was supposed to be fire retardant

209
00:07:31,189 --> 00:07:29,360
okay and what it was attached to either

210
00:07:34,469 --> 00:07:31,199
had a different technology

211
00:07:36,469 --> 00:07:34,479
was a different fiber or fiber blend or

212
00:07:37,909 --> 00:07:36,479
the application technique was different

213
00:07:40,390 --> 00:07:37,919

so every single one of those was the

214
00:07:42,070 --> 00:07:40,400
same so there was no variation in how

215
00:07:43,589 --> 00:07:42,080
those how those

216
00:07:45,670 --> 00:07:43,599
products were put together which was

217
00:07:47,430 --> 00:07:45,680
nice and we ran those exact same

218
00:07:49,350 --> 00:07:47,440
experiments here on earth

219
00:07:51,670 --> 00:07:49,360
as well as there and

220
00:07:52,869 --> 00:07:51,680
it went really well much greater than we

221
00:07:54,869 --> 00:07:52,879
could have hoped for

222
00:07:56,710 --> 00:07:54,879
the preliminary results we got have

223
00:07:58,950 --> 00:07:56,720
given us some really surprising

224
00:08:00,869 --> 00:07:58,960
information uh one i'll tell you about

225
00:08:03,350 --> 00:08:00,879
that was just very interesting to all of

226
00:08:05,350 --> 00:08:03,360
our scientists 100 cotton is usually

227
00:08:07,749 --> 00:08:05,360
used as a control because it burns

228
00:08:09,510 --> 00:08:07,759
really really well now it forms a char

229
00:08:12,469 --> 00:08:09,520
but it burns really fast so if you were

230
00:08:15,110 --> 00:08:12,479
to take a 100 millimeter long sample of

231
00:08:17,430 --> 00:08:15,120
100 cotton and ignite it like we ignited

232
00:08:20,469 --> 00:08:17,440
it here on earth that sample would burn

233
00:08:22,150 --> 00:08:20,479
in several seconds in space

234
00:08:24,230 --> 00:08:22,160
the big surprise was it burned

235
00:08:27,189 --> 00:08:24,240
completely like you would expect but it

236
00:08:30,469 --> 00:08:27,199
took 10 times as long which really told

237
00:08:33,190 --> 00:08:30,479
us that the buoyancy the air flow and

238
00:08:36,070 --> 00:08:33,200

all that has a very significant

239
00:08:39,589 --> 00:08:36,080
controlling factor because the control

240
00:08:40,389 --> 00:08:39,599
which had no fr on it just took so long

241
00:08:42,790 --> 00:08:40,399
to burn

242
00:08:44,070 --> 00:08:42,800
so it gave us some insights into what

243
00:08:46,710 --> 00:08:44,080
can you do

244
00:08:49,190 --> 00:08:46,720
to affect that affect that here on earth

245
00:08:50,550 --> 00:08:49,200
in a different way and that that

246
00:08:52,070 --> 00:08:50,560
when we get into that information a

247
00:08:53,670 --> 00:08:52,080
little more again it's a little

248
00:08:54,870 --> 00:08:53,680
preliminary we'll figure out whether we

249
00:08:56,230 --> 00:08:54,880
need to go run another set of

250
00:08:58,389 --> 00:08:56,240
experiments but right now we've got more

251
00:09:00,310 --> 00:08:58,399
data than than i think we can handle

252
00:09:01,670 --> 00:09:00,320
trying to go through it all

253
00:09:03,750 --> 00:09:01,680
thanks so much for joining us and again

254
00:09:05,509 --> 00:09:03,760
this was chris de souza who is the vice

255
00:09:06,870 --> 00:09:05,519
president of millikin research thanks