To MPLM

1
00:00:08,549 --> 00:00:06,950
well freezers are the lifeline if you

2
00:00:10,790 --> 00:00:08,559
will for much of the human research that

3
00:00:12,789 --> 00:00:10,800
takes place on the station crew members

4
00:00:14,629 --> 00:00:12,799
collect blood and urine samples but they

5
00:00:16,310 --> 00:00:14,639
must have a way to return those to earth

6
00:00:18,390 --> 00:00:16,320
at the proper temperatures that's where

7
00:00:20,470 --> 00:00:18,400
something fittingly called polar comes

8
00:00:21,750 --> 00:00:20,480
in polar units are being tested here at

9
00:00:23,670 --> 00:00:21,760
the marshall center like many other

10
00:00:26,550 --> 00:00:23,680
payloads before marshall has the

11
00:00:28,390 --> 00:00:26,560
facilities to simulate launch conditions

12
00:00:30,230 --> 00:00:28,400
and make sure that these payloads are

13
00:00:32,229 --> 00:00:30,240

ready for launch as well as operating on

14
00:00:35,670 --> 00:00:32,239
the station i caught up with some of the

15
00:00:37,270 --> 00:00:35,680
engineers to learn more about polar

16
00:00:39,190 --> 00:00:37,280
i'm here in what's called the shaker

17
00:00:40,869 --> 00:00:39,200
room with josh dunn and he is the

18
00:00:43,270 --> 00:00:40,879
systems engineer at the university of

19
00:00:44,549 --> 00:00:43,280
alabama birmingham and josh

20
00:00:46,069 --> 00:00:44,559
what are we doing here in the shaker

21
00:00:48,389 --> 00:00:46,079
room you're testing something called

22
00:00:50,549 --> 00:00:48,399
polar what is polar well polar is a

23
00:00:53,029 --> 00:00:50,559
freezer that was designed and built by

24
00:00:54,709 --> 00:00:53,039
the university of alabama at birmingham

25
00:00:57,110 --> 00:00:54,719
and it's the latest addition to the

26
00:00:58,630 --> 00:00:57,120
available cold stowage resources on the

27
00:01:01,510 --> 00:00:58,640
space station

28
00:01:03,430 --> 00:01:01,520
and it's a it's a small freezer uh it's

29
00:01:05,189 --> 00:01:03,440
designed to fit within the single locker

30
00:01:07,990 --> 00:01:05,199
dimension requirements for express rack

31
00:01:10,070 --> 00:01:08,000
payloads and to give some perspective on

32
00:01:12,550 --> 00:01:10,080
that i would say it's approximately half

33
00:01:15,749 --> 00:01:12,560
the size of a your typical mini fridge

34
00:01:17,429 --> 00:01:15,759
or dorm room type refrigerator

35
00:01:20,310 --> 00:01:17,439
operationally it's got a temperature

36
00:01:22,789 --> 00:01:20,320
range that ranges anywhere from as warm

37
00:01:23,990 --> 00:01:22,799
as four degrees celsius slightly above

38
00:01:26,550 --> 00:01:24,000

freezing

39
00:01:28,789 --> 00:01:26,560
all the way to negative 95 degrees

40
00:01:30,789 --> 00:01:28,799
celsius so how does that compare to my

41
00:01:33,030 --> 00:01:30,799
refrigerator and freezer at home well i

42
00:01:35,670 --> 00:01:33,040
think the typical refrigerator at home

43
00:01:38,310 --> 00:01:35,680
is somewhere around 4 degrees on the

44
00:01:40,310 --> 00:01:38,320
upper end and then in the freezer it's

45
00:01:42,310 --> 00:01:40,320
in the negative 20 range so it's quite a

46
00:01:44,069 --> 00:01:42,320
bit different so this facility is really

47
00:01:47,030 --> 00:01:44,079
vital to human research tell us about

48
00:01:49,429 --> 00:01:47,040
what it what it transports so polar's

49
00:01:51,270 --> 00:01:49,439
main purpose is transporting science to

50
00:01:53,429 --> 00:01:51,280
and from the space station

51
00:01:55,510 --> 00:01:53,439
and there's uh

52
00:01:57,030 --> 00:01:55,520
really a wide variety of science that

53
00:01:59,749 --> 00:01:57,040
could be stowed within it it provides a

54
00:02:01,350 --> 00:01:59,759
generically designed sample volume

55
00:02:03,030 --> 00:02:01,360
so pretty much anything that requires

56
00:02:05,190 --> 00:02:03,040
transportation in a thermally controlled

57
00:02:06,789 --> 00:02:05,200
environment can be stowed within it

58
00:02:08,869 --> 00:02:06,799
typically

59
00:02:10,710 --> 00:02:08,879
biological samples such as blood and

60
00:02:12,630 --> 00:02:10,720
urine specimens are what it's stowed but

61
00:02:14,470 --> 00:02:12,640
uh it's certainly not limited to those

62
00:02:16,150 --> 00:02:14,480
types of samples

63
00:02:18,869 --> 00:02:16,160

so you're involved because you're an

64
00:02:20,150 --> 00:02:18,879
engineer at uab and you guys

65
00:02:21,830 --> 00:02:20,160
built this tell us about the

66
00:02:25,110 --> 00:02:21,840
relationship between

67
00:02:27,910 --> 00:02:25,120
you guys and nasa so the uab and nasa

68
00:02:29,910 --> 00:02:27,920
relationship goes back several years our

69
00:02:32,229 --> 00:02:29,920
the engineering division of our center

70
00:02:33,830 --> 00:02:32,239
began uh supporting

71
00:02:35,509 --> 00:02:33,840
development of protein crystal growth

72
00:02:37,509 --> 00:02:35,519
hardware for experiments on the space

73
00:02:39,190 --> 00:02:37,519
shuttle and over the years we've kind of

74
00:02:40,790 --> 00:02:39,200
evolved and

75
00:02:42,710 --> 00:02:40,800
our main focus has shifted into the

76
00:02:45,509 --> 00:02:42,720
development of cold stowage payloads

77
00:02:47,190 --> 00:02:45,519
such as polar and glacier and we also

78
00:02:49,589 --> 00:02:47,200
have another payload called merlin which

79
00:02:51,350 --> 00:02:49,599
is a freezer refrigerator incubator i

80
00:02:52,710 --> 00:02:51,360
think we have four merlins on board the

81
00:02:54,309 --> 00:02:52,720
station that are supporting everything

82
00:02:55,509 --> 00:02:54,319
from

83
00:02:57,830 --> 00:02:55,519
science to

84
00:03:00,229 --> 00:02:57,840
stowage of the crews food and drinks in

85
00:03:01,750 --> 00:03:00,239
the galley so

86
00:03:03,430 --> 00:03:01,760
we support payload integration and

87
00:03:05,670 --> 00:03:03,440
operations out of ksc and then our

88
00:03:07,030 --> 00:03:05,680

contracts are managed out of jsc so

89
00:03:09,190 --> 00:03:07,040
between the testing we do here at

90
00:03:10,869 --> 00:03:09,200
marshall and the other activities at the

91
00:03:12,710 --> 00:03:10,879
other centers we have a close working

92
00:03:13,589 --> 00:03:12,720
relationship with with multiple nasa

93
00:03:14,630 --> 00:03:13,599
centers

94
00:03:16,550 --> 00:03:14,640
and now we're going to talk to one of

95
00:03:17,430 --> 00:03:16,560
your colleagues about the actual testing

96
00:03:19,190 --> 00:03:17,440
okay

97
00:03:22,149 --> 00:03:19,200
i'm joined now by aaron reese he is a

98
00:03:23,990 --> 00:03:22,159
mechanical engineer at uab and

99
00:03:26,390 --> 00:03:24,000
you're kind of handling the testing here

100
00:03:27,750 --> 00:03:26,400
of polar tell us what the testing is we

101
00:03:29,589 --> 00:03:27,760
say we're in the shaker room what does

102
00:03:31,750 --> 00:03:29,599
that mean yes ma'am we're doing a

103
00:03:34,710 --> 00:03:31,760
vibration testing on polar as part of

104
00:03:37,430 --> 00:03:34,720
the flight qualification process

105
00:03:39,750 --> 00:03:37,440
each unit is uh

106
00:03:42,470 --> 00:03:39,760
tested and analyzed to ensure that it

107
00:03:44,710 --> 00:03:42,480
meets the flight requirements so it's

108
00:03:47,350 --> 00:03:44,720
actual flight hardware brought here and

109
00:03:49,030 --> 00:03:47,360
then you shake it we are able to from

110
00:03:50,949 --> 00:03:49,040
shaking the unit we

111
00:03:52,949 --> 00:03:50,959
impart a

112
00:03:55,350 --> 00:03:52,959
flight-like vibration spectrum onto the

113
00:03:59,270 --> 00:03:55,360

unit and from that we can determine the

114
00:04:01,030 --> 00:03:59,280
resonant response of the unit and also

115
00:04:02,710 --> 00:04:01,040
quantify the workmanship of the

116
00:04:04,630 --> 00:04:02,720
production of the unit so we can verify

117
00:04:06,869 --> 00:04:04,640
that it was built properly

118
00:04:09,350 --> 00:04:06,879
now we're not talking actual vibrations

119
00:04:11,270 --> 00:04:09,360
like you feel at launch are we yes we

120
00:04:14,390 --> 00:04:11,280
are it's uh exposed to a flight like

121
00:04:16,150 --> 00:04:14,400
vibration spectrum but not quite there

122
00:04:18,789 --> 00:04:16,160
right not quite at that level for we

123
00:04:20,870 --> 00:04:18,799
have uh a qualification unit that's

124
00:04:23,510 --> 00:04:20,880
exposed to uh

125
00:04:25,430 --> 00:04:23,520
over a qualification level vibration

126
00:04:27,270 --> 00:04:25,440
load and then these are exposed to an

127
00:04:28,390 --> 00:04:27,280
acceptance level which is slightly lower

128
00:04:30,710 --> 00:04:28,400
than that

129
00:04:32,950 --> 00:04:30,720
to determine the workmanship of the unit

130
00:04:34,870 --> 00:04:32,960
so how long does this testing go on

131
00:04:36,550 --> 00:04:34,880
uh each unit is tested this will take

132
00:04:38,469 --> 00:04:36,560
the vibration testing typically takes a

133
00:04:40,230 --> 00:04:38,479
day and then we'll move on to different

134
00:04:43,350 --> 00:04:40,240
environmental testing but we have to do

135
00:04:45,030 --> 00:04:43,360
it for 14 units so it spans the entire

136
00:04:47,189 --> 00:04:45,040
production of the project so it's not

137
00:04:49,830 --> 00:04:47,199
just the shaker test what else do we do

138
00:04:51,749 --> 00:04:49,840

we do uh we'll be doing acoustic testing

139
00:04:53,189 --> 00:04:51,759
but we also come back up here for to

140
00:04:54,950 --> 00:04:53,199
marshall for

141
00:04:56,390 --> 00:04:54,960
different things such as electromagnetic

142
00:04:58,150 --> 00:04:56,400
interference testing

143
00:05:00,070 --> 00:04:58,160
and functional checkouts with a flight

144
00:05:01,350 --> 00:05:00,080
like express rack

145
00:05:03,670 --> 00:05:01,360
throughout different stages of the

146
00:05:06,390 --> 00:05:03,680
production and flight preparation

147
00:05:07,749 --> 00:05:06,400
process why the acoustic testing there

148
00:05:09,830 --> 00:05:07,759
there are maximum noise limit

149
00:05:11,830 --> 00:05:09,840
requirements on the station to prevent

150
00:05:15,029 --> 00:05:11,840
the crew from experiencing unhealthy

151
00:05:17,350 --> 00:05:15,039
noise limits so we've

152
00:05:20,790 --> 00:05:17,360
operate polar at its maximum it's

153
00:05:23,189 --> 00:05:20,800
loudest state and verify that we are

154
00:05:25,110 --> 00:05:23,199
not exceeding those limits so what's it

155
00:05:27,350 --> 00:05:25,120
like for you working with this actual

156
00:05:29,350 --> 00:05:27,360
flight hardware and really helping with

157
00:05:31,189 --> 00:05:29,360
the research program it's it's pretty

158
00:05:33,029 --> 00:05:31,199
awesome i mean it's great to know that

159
00:05:34,150 --> 00:05:33,039
one one thing that we've worked on is

160
00:05:36,150 --> 00:05:34,160
going to be

161
00:05:38,230 --> 00:05:36,160
orbiting the earth on the space station

162
00:05:40,950 --> 00:05:38,240
it's going to be used to

163
00:05:42,629 --> 00:05:40,960

progress science and uh

164
00:05:44,710 --> 00:05:42,639
it's it's incredibly we're incredibly

165
00:05:45,909 --> 00:05:44,720
fortunate to have this opportunity

166
00:05:47,830 --> 00:05:45,919
you stand there in birmingham and you

167
00:05:49,350 --> 00:05:47,840
watch it fly over and say hey