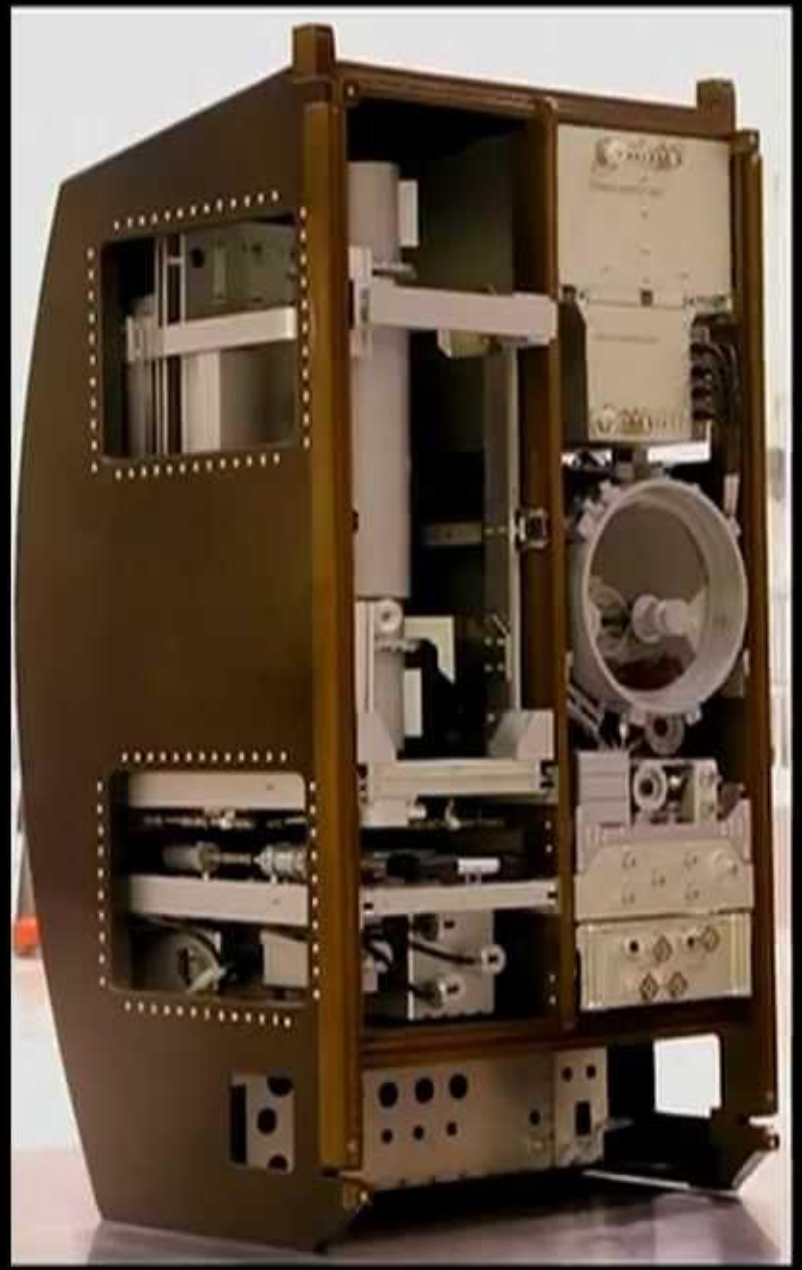

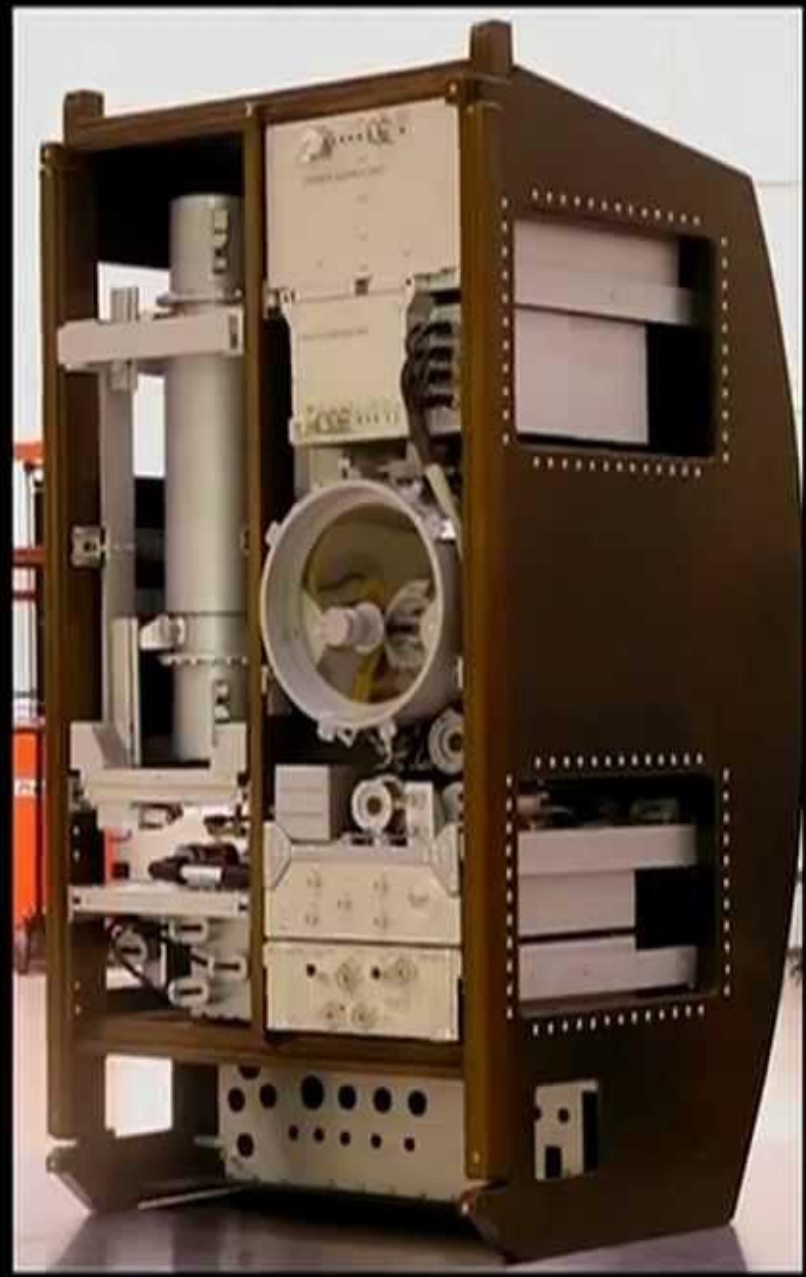

1
00:00:04,870 --> 00:00:03,350
for now why don't we go ahead and head

2
00:00:06,869 --> 00:00:04,880
out to the marshall space flight center

3
00:00:08,710 --> 00:00:06,879
in huntsville alabama where laurie megs

4
00:00:11,110 --> 00:00:08,720
is standing by live at the payload

5
00:00:12,390 --> 00:00:11,120
operations integration center hey lori

6
00:00:14,629 --> 00:00:12,400
we're uh we're talking a little bit

7
00:00:16,390 --> 00:00:14,639
about material science this week that's

8
00:00:17,910 --> 00:00:16,400
right we sure are we're talking about a

9
00:00:19,189 --> 00:00:17,920
lot of material science a lot of

10
00:00:21,109 --> 00:00:19,199
materials have been tested on the

11
00:00:23,269 --> 00:00:21,119
international space station so far

12
00:00:25,269 --> 00:00:23,279
anything from metals to ceramics to

13
00:00:26,550 --> 00:00:25,279

plastics and a couple of workhorses that

14
00:00:27,750 --> 00:00:26,560
are managed here at the marshall space

15
00:00:29,509 --> 00:00:27,760
flight center here in the payload

16
00:00:31,349 --> 00:00:29,519
operations integration center have

17
00:00:33,350 --> 00:00:31,359
helped process those samples they're the

18
00:00:34,709 --> 00:00:33,360
microgravity science glove box and the

19
00:00:36,310 --> 00:00:34,719
materials science research rack and

20
00:00:38,150 --> 00:00:36,320
joining me now is one of their operation

21
00:00:40,069 --> 00:00:38,160
controllers john cramer thanks for

22
00:00:42,470 --> 00:00:40,079
joining us today john tell us what your

23
00:00:45,190 --> 00:00:42,480
team does here for those two facilities

24
00:00:47,190 --> 00:00:45,200
we operate the micro gravity science

25
00:00:49,750 --> 00:00:47,200
glove box which provides a

26
00:00:52,389 --> 00:00:49,760
controlled environment for the crew to

27
00:00:54,389 --> 00:00:52,399
be able to perform experiments

28
00:00:57,430 --> 00:00:54,399
and how do you help the crew process

29
00:00:59,590 --> 00:00:57,440
materials well the crew is very involved

30
00:01:01,830 --> 00:00:59,600
in this with the crew activities and

31
00:01:03,349 --> 00:01:01,840
they follow a set of procedures and

32
00:01:05,429 --> 00:01:03,359
written procedures and we're there to

33
00:01:07,030 --> 00:01:05,439
help them if they have any questions

34
00:01:08,630 --> 00:01:07,040
and you're kind of under the gun right

35
00:01:10,950 --> 00:01:08,640
now i guess you could say we had some

36
00:01:12,310 --> 00:01:10,960
samples come up on the dragon and those

37
00:01:14,390 --> 00:01:12,320
samples have to be processed and then

38
00:01:15,590 --> 00:01:14,400

returned on the dragon so tell us about

39
00:01:17,350 --> 00:01:15,600
that right now what you're working on

40
00:01:19,830 --> 00:01:17,360
well right now we're working on cslm

41
00:01:21,590 --> 00:01:19,840
cslm stands for coarsening in solid

42
00:01:22,630 --> 00:01:21,600
liquid mixtures

43
00:01:23,590 --> 00:01:22,640
and

44
00:01:25,270 --> 00:01:23,600
they are

45
00:01:28,149 --> 00:01:25,280
life limited so they have to go up and

46
00:01:29,030 --> 00:01:28,159
come down as quickly as possible

47
00:01:30,789 --> 00:01:29,040
and

48
00:01:32,789 --> 00:01:30,799
what are the samples the samples right

49
00:01:35,109 --> 00:01:32,799
now that are there are a

50
00:01:36,950 --> 00:01:35,119
a lead 10 mixture

51
00:01:39,749 --> 00:01:36,960
they're heated to

52
00:01:41,749 --> 00:01:39,759
specific temperatures and

53
00:01:44,630 --> 00:01:41,759
then they solidify and they come back

54
00:01:46,710 --> 00:01:44,640
down on the ground and they're looked at

55
00:01:47,590 --> 00:01:46,720
so how long does it take to process a

56
00:01:52,389 --> 00:01:47,600
sample

57
00:01:54,389 --> 00:01:52,399
that they have chosen um

58
00:01:57,190 --> 00:01:54,399
i believe we have six samples uh we've

59
00:01:58,870 --> 00:01:57,200
gone through three sample runs so far

60
00:02:00,950 --> 00:01:58,880
um

61
00:02:01,990 --> 00:02:00,960
they anywhere from a few hours to a few

62
00:02:03,910 --> 00:02:02,000
days

63
00:02:05,270 --> 00:02:03,920

and a couple more weeks of this and then

64
00:02:06,870 --> 00:02:05,280
and then it just keeps on going right it

65
00:02:09,430 --> 00:02:06,880
keeps on going yes it does what else are

66
00:02:11,510 --> 00:02:09,440
we looking forward to we're after cslm i

67
00:02:13,510 --> 00:02:11,520
believe we're doing a payload called

68
00:02:16,150 --> 00:02:13,520
bass and then from there it's uh payload

69
00:02:17,430 --> 00:02:16,160
ccf saudi and in space and you're

70
00:02:18,949 --> 00:02:17,440
supposed to be on consoles so i'll let

71
00:02:21,030 --> 00:02:18,959
you get back to it thank you thanks so

72
00:02:23,030 --> 00:02:21,040
much for joining us john i also had the

73
00:02:24,550 --> 00:02:23,040
opportunity to speak with sean reagan

74
00:02:26,309 --> 00:02:24,560
and he is the manager of the material

75
00:02:27,910 --> 00:02:26,319
science research rack here at the

76
00:02:29,589 --> 00:02:27,920
marshall space flight center and he's

77
00:02:31,750 --> 00:02:29,599
going to tell us what the materials

78
00:02:33,509 --> 00:02:31,760
science research rack is used for

79
00:02:35,110 --> 00:02:33,519
materials science research rack is for

80
00:02:36,949 --> 00:02:35,120
processing different types of materials

81
00:02:39,030 --> 00:02:36,959
on orbit

82
00:02:41,589 --> 00:02:39,040
basically we're taking materials melting

83
00:02:43,430 --> 00:02:41,599
them having them re-solidify in in the

84
00:02:45,030 --> 00:02:43,440
microgravity environment of space so

85
00:02:45,990 --> 00:02:45,040
that way you remove the effects of

86
00:02:47,750 --> 00:02:46,000
gravity

87
00:02:49,509 --> 00:02:47,760
the pi the principal investigators will

88
00:02:50,869 --> 00:02:49,519

take those and compare that to what

89
00:02:51,990 --> 00:02:50,879
actually happens on the ground and

90
00:02:53,670 --> 00:02:52,000
there's a lot of things they can

91
00:02:55,910 --> 00:02:53,680
discover when they remove those gravity

92
00:02:57,830 --> 00:02:55,920
effects from that so this rack provides

93
00:02:59,750 --> 00:02:57,840
us the opportunity to go do that with

94
00:03:01,430 --> 00:02:59,760
different types of samples so sean what

95
00:03:02,869 --> 00:03:01,440
kinds of samples have we seen in the

96
00:03:04,309 --> 00:03:02,879
materials rack

97
00:03:05,830 --> 00:03:04,319
we've seen mostly metal samples

98
00:03:07,350 --> 00:03:05,840
processed so far the principal

99
00:03:09,270 --> 00:03:07,360
investigators will determine what type

100
00:03:11,270 --> 00:03:09,280
of samples they would like to process

101
00:03:12,790 --> 00:03:11,280
that will go through a science community

102
00:03:14,229 --> 00:03:12,800
review to make sure that everybody

103
00:03:15,910 --> 00:03:14,239
agrees yes that's a good thing for us to

104
00:03:17,910 --> 00:03:15,920
go process on orbit because it does take

105
00:03:20,550 --> 00:03:17,920
a lot to get get samples up to to the

106
00:03:21,589 --> 00:03:20,560
space station to process so that's been

107
00:03:23,110 --> 00:03:21,599
the main thing that we've been going

108
00:03:24,630 --> 00:03:23,120
through so far is the metals but we can

109
00:03:25,589 --> 00:03:24,640
process different types of samples as

110
00:03:26,869 --> 00:03:25,599
well

111
00:03:29,750 --> 00:03:26,879
so it really is an international

112
00:03:31,670 --> 00:03:29,760
partnership yes it is uh the european

113
00:03:33,509 --> 00:03:31,680

space agency esa has been involved

114
00:03:34,869 --> 00:03:33,519
heavily with us on this in fact they

115
00:03:37,430 --> 00:03:34,879
built what we call the right side of the

116
00:03:38,630 --> 00:03:37,440
rack they built the the furnace and the

117
00:03:40,550 --> 00:03:38,640
processing

118
00:03:42,630 --> 00:03:40,560
samples that go on that side

119
00:03:44,070 --> 00:03:42,640
nasa built the the left side of the rack

120
00:03:46,070 --> 00:03:44,080
to provide power data thermal

121
00:03:47,509 --> 00:03:46,080
conditioning and then so far esa has

122
00:03:49,270 --> 00:03:47,519
been building the sample cartridge

123
00:03:50,149 --> 00:03:49,280
assemblies that are processed within the

124
00:03:52,149 --> 00:03:50,159
rack

125
00:03:54,550 --> 00:03:52,159
but we're also starting to

126
00:03:56,710 --> 00:03:54,560
build our own for nasa right yes we've

127
00:03:58,789 --> 00:03:56,720
started a a project here at marshall

128
00:04:01,750 --> 00:03:58,799
space flight center to build sample

129
00:04:03,910 --> 00:04:01,760
cartridge assemblies for nasa so we have

130
00:04:06,630 --> 00:04:03,920
more u.s principal investigator

131
00:04:07,670 --> 00:04:06,640
involvement in the rack as well

132
00:04:09,589 --> 00:04:07,680
let's talk a little bit about the

133
00:04:11,670 --> 00:04:09,599
upgrades you've upgraded some software

134
00:04:13,190 --> 00:04:11,680
on the rack right we have we just

135
00:04:15,750 --> 00:04:13,200
finished an upgrade to the software it

136
00:04:18,310 --> 00:04:15,760
was uploaded to the rack back in

137
00:04:19,749 --> 00:04:18,320
december basically this software upgrade

138
00:04:21,590 --> 00:04:19,759

will

139
00:04:23,350 --> 00:04:21,600
give us the room that if we have a

140
00:04:24,790 --> 00:04:23,360
communication problem between the rack

141
00:04:27,590 --> 00:04:24,800
and the rest of space station while

142
00:04:29,030 --> 00:04:27,600
we're processing at high temperatures

143
00:04:30,790 --> 00:04:29,040
we won't have to do what we call a hard

144
00:04:32,230 --> 00:04:30,800
shutdown basically where we remove all

145
00:04:33,749 --> 00:04:32,240
power and services from the rack at

146
00:04:35,590 --> 00:04:33,759
those high temperatures it puts us into

147
00:04:36,950 --> 00:04:35,600
a controlled cooldown mode which is

148
00:04:38,870 --> 00:04:36,960
better for the rack and for the sample

149
00:04:40,550 --> 00:04:38,880
being processed as well it prevents us

150
00:04:42,150 --> 00:04:40,560
from having other issues with the rack

151
00:04:44,710 --> 00:04:42,160
what temperatures are we talking about

152
00:04:48,310 --> 00:04:44,720
we're processing generally in the 1000

153
00:04:50,870 --> 00:04:48,320
degrees c range uh the rack can go up to

154
00:04:52,310 --> 00:04:50,880
1200 degrees c on up to 1400 degrees c

155
00:04:54,390 --> 00:04:52,320
but so far we've not had any samples

156
00:04:55,590 --> 00:04:54,400
processed at those temperatures

157
00:04:57,270 --> 00:04:55,600
it works just fine at the lower

158
00:04:59,030 --> 00:04:57,280
temperatures if you call that low right

159
00:05:00,710 --> 00:04:59,040
if you call that low yes

160
00:05:03,430 --> 00:05:00,720
what are the benefits that we learn back

161
00:05:05,590 --> 00:05:03,440
on earth from from the msrr

162
00:05:06,950 --> 00:05:05,600
samples when you remove the gravity

163
00:05:09,189 --> 00:05:06,960

effects here on earth and processed in

164
00:05:10,950 --> 00:05:09,199
the microgravity environment of space it

165
00:05:12,390 --> 00:05:10,960
lets the principal investigators see a

166
00:05:14,150 --> 00:05:12,400
lot better about how the materials come

167
00:05:15,670 --> 00:05:14,160
together and form

168
00:05:16,870 --> 00:05:15,680
different types of materials and

169
00:05:19,510 --> 00:05:16,880
different type of bonds between the

170
00:05:21,990 --> 00:05:19,520
materials that can be applied to

171
00:05:23,830 --> 00:05:22,000
lots of manufacturing

172
00:05:25,749 --> 00:05:23,840
items back on earth whether it be

173
00:05:28,469 --> 00:05:25,759
turbine blades or you know high-speed

174
00:05:30,070 --> 00:05:28,479
turbine blades or other items all across

175
00:05:32,870 --> 00:05:30,080
the spectrum it has a wide ranging

176
00:05:34,550 --> 00:05:32,880
impact back here on earth

177
00:05:35,749 --> 00:05:34,560
thanks to sean for that and that'll do

178
00:05:37,590 --> 00:05:35,759
it for us from here at the payload