
ACCO
20
TONS

1
00:00:17,590 --> 00:00:15,190
the james webb space telescope is what's

2
00:00:20,070 --> 00:00:17,600
known as a reflector telescope two

3
00:00:22,230 --> 00:00:20,080
mirrors one primary and one secondary

4
00:00:24,790 --> 00:00:22,240
used to collect and focus light coming

5
00:00:27,269 --> 00:00:24,800
from far away objects they're looking at

6
00:00:29,509 --> 00:00:27,279
the primary mirror on james webb is so

7
00:00:31,910 --> 00:00:29,519
huge it needs to be assembled from 18

8
00:00:33,670 --> 00:00:31,920
separate mirrors to find out more about

9
00:00:35,510 --> 00:00:33,680
these mirrors and how nasa is making

10
00:00:37,190 --> 00:00:35,520
sure they work as well in space as they

11
00:00:38,950 --> 00:00:37,200
do on the ground we've come to the

12
00:00:41,270 --> 00:00:38,960
marshall space flight center in

13
00:00:43,430 --> 00:00:41,280

huntsville alabama we're here with jeff

14
00:00:45,270 --> 00:00:43,440
cagley and he's the director of the

15
00:00:47,190 --> 00:00:45,280
x-ray and cryogenic facility here at

16
00:00:48,790 --> 00:00:47,200
marshall space flight center so jeff

17
00:00:50,470 --> 00:00:48,800
tell us a little bit about where we are

18
00:00:52,950 --> 00:00:50,480
and what are you about to see

19
00:00:54,790 --> 00:00:52,960
mary we are in the entry area for our

20
00:00:56,869 --> 00:00:54,800
large clean room

21
00:00:58,549 --> 00:00:56,879
these james webb space telescopes

22
00:01:00,229 --> 00:00:58,559
mirrors have to stay in a very clean

23
00:01:01,430 --> 00:01:00,239
environment and we have that type of

24
00:01:02,869 --> 00:01:01,440
environment here so we're going to see

25
00:01:04,869 --> 00:01:02,879
if we can get a better look at those

26
00:01:05,990 --> 00:01:04,879
mirrors and to do that we're going to

27
00:01:07,830 --> 00:01:06,000
have to

28
00:01:27,749 --> 00:01:07,840
get dressed up a little bit so that only

29
00:01:32,789 --> 00:01:29,990
we're just about to pull the entire test

30
00:01:36,550 --> 00:01:32,799
stand assembly into the vacuum chamber

31
00:01:38,550 --> 00:01:36,560
with the three james webb mirrors aboard

32
00:01:41,190 --> 00:01:38,560
i noticed there's just three mirrors why

33
00:01:42,950 --> 00:01:41,200
is that i think james webb has 18 right

34
00:01:44,870 --> 00:01:42,960
right the james webb telescope is made

35
00:01:46,310 --> 00:01:44,880
up of 18 mirrors we're going to have

36
00:01:47,670 --> 00:01:46,320
each one of those mirrors come through

37
00:01:49,429 --> 00:01:47,680
here twice

38
00:01:51,749 --> 00:01:49,439

the first time through we actually

39
00:01:53,830 --> 00:01:51,759
measure the deformation as a function of

40
00:01:56,389 --> 00:01:53,840
temperature as we transition down to

41
00:01:58,230 --> 00:01:56,399
minus 400 degrees fahrenheit

42
00:02:00,149 --> 00:01:58,240
the second time through we verify that

43
00:02:01,749 --> 00:02:00,159
the mirrors actually perform correctly

44
00:02:03,030 --> 00:02:01,759
at that temperature

45
00:02:04,389 --> 00:02:03,040
and you said it's about to go into the

46
00:02:05,670 --> 00:02:04,399
chamber can we go inside the chamber

47
00:02:07,429 --> 00:02:05,680
just to see what it's like and maybe

48
00:02:09,109 --> 00:02:07,439
tell us a little bit about the chamber

49
00:02:14,630 --> 00:02:09,119
yeah we'll try to run in there and see

50
00:02:18,630 --> 00:02:16,710
the mirrors behind us will be pulled in

51
00:02:20,630 --> 00:02:18,640
and we'll will actually reside just up

52
00:02:22,710 --> 00:02:20,640
in front of us here inside the chamber

53
00:02:25,510 --> 00:02:22,720
where they can be cooled to minus 400

54
00:02:27,270 --> 00:02:25,520
degrees why a vacuum chamber

55
00:02:29,350 --> 00:02:27,280
well we have to simulate not only the

56
00:02:31,990 --> 00:02:29,360
thermal environment but also the vacuum

57
00:02:34,150 --> 00:02:32,000
environment of space you pull these in

58
00:02:37,030 --> 00:02:34,160
and what kind of things are you looking

59
00:02:38,790 --> 00:02:37,040
for in the mirror well the the ball

60
00:02:40,390 --> 00:02:38,800
aerospace team is actually responsible

61
00:02:41,990 --> 00:02:40,400
for the testing and they will actually

62
00:02:44,309 --> 00:02:42,000
be looking at these

63
00:02:46,710 --> 00:02:44,319

mirrors as they transition to cryogenic

64
00:02:48,630 --> 00:02:46,720
temperature through a window up in the

65
00:02:50,550 --> 00:02:48,640
front of our vacuum chamber and they'll

66
00:02:52,869 --> 00:02:50,560
be looking at these mirrors with an

67
00:02:54,309 --> 00:02:52,879
instrument called an interferometer

68
00:02:56,550 --> 00:02:54,319
and that's going to give them a very

69
00:02:58,790 --> 00:02:56,560
detailed surface map

70
00:03:00,070 --> 00:02:58,800
of what that mirror looks like and how

71
00:03:02,149 --> 00:03:00,080
it deforms

72
00:03:04,309 --> 00:03:02,159
as a function of temperature and my last

73
00:03:06,550 --> 00:03:04,319
question is why is it so important to be

74
00:03:08,710 --> 00:03:06,560
so precise with these mirrors

75
00:03:09,750 --> 00:03:08,720
well the primary mirror for a telescope

76
00:03:11,030 --> 00:03:09,760
is the

77
00:03:13,350 --> 00:03:11,040
part of the telescope that really

78
00:03:15,110 --> 00:03:13,360
matters it's gathering all the light

79
00:03:16,229 --> 00:03:15,120
that ultimately gets focused on the

80
00:03:18,470 --> 00:03:16,239
instrument

81
00:03:29,990 --> 00:03:18,480
and the larger and the better the

82
00:03:33,910 --> 00:03:31,430
these mirrors will be in the vacuum

83
00:03:36,070 --> 00:03:33,920
chamber for about 15 weeks going through

84
00:03:38,390 --> 00:03:36,080
seven cycles of temperature changes from

85
00:03:39,390 --> 00:03:38,400
room temperature to the cold extreme of

86
00:03:42,949 --> 00:03:39,400
space