



1
00:00:12,150 --> 00:00:04,120
music

2
00:00:12,170 --> 00:00:16,220
Right now, we are at the Johnson Space Center in Houston, Texas, standing

3
00:00:16,240 --> 00:00:20,270
inside the space environment simulation laboratory in front of Chamber A

4
00:00:20,290 --> 00:00:24,300
Chamber A actually the largest thermal vacuum chamber in the world

5
00:00:24,320 --> 00:00:28,310
It has a 40 foot diameter door which weighs 40 tons

6
00:00:28,330 --> 00:00:32,380
The door is Hydraulically operated and it's 3 tons

7
00:00:32,400 --> 00:00:36,410
and it's perfectly balanced, it's so balanced that 2 people can push against the door

8
00:00:36,430 --> 00:00:40,550
and move it. Chamber A is currently undergoing

9
00:00:40,570 --> 00:00:44,560
upgrades so that it can house the largest satellite, the James Webb Space Telescope

10
00:00:44,580 --> 00:00:48,600
and its testing for the space environment

11
00:00:48,620 --> 00:00:52,670
So for the last 3 years we've been rebuilding, remodeling the interior

12
00:00:52,690 --> 00:00:56,700
of the chamber so that it's acceptable for the cleanliness and the temperature that

13
00:00:56,720 --> 00:01:00,790

James Webb needs. Some of the things we've done, is we've upgraded

14

00:01:00,810 --> 00:01:04,860

our helium system, we've upgraded our liquid nitrogen system.

15

00:01:04,880 --> 00:01:08,890

As well as updating our air flow management system.

16

00:01:08,910 --> 00:01:12,960

With all these upgrades put together, we can now reach temperatures that no one has ever

17

00:01:12,980 --> 00:01:16,990

really been able to reach before.

18

00:01:17,010 --> 00:01:21,000

We're actually going to 11 Kelvin, which is 11 degrees Celsius essentially

19

00:01:21,020 --> 00:01:25,020

above Absolute Zero, so the absolute coldest we can get to.

20

00:01:25,040 --> 00:01:29,200

That's possible, not even really possible.

21

00:01:29,220 --> 00:01:33,260

What we get out of a thermal vacuum chamber test

22

00:01:33,280 --> 00:01:37,280

is that we can evaluate whether or not the spacecraft

23

00:01:37,300 --> 00:01:41,360

all its systems perform like they're supposed to perform once they're out

24

00:01:41,380 --> 00:01:45,480

in space. All the air

25

00:01:45,500 --> 00:01:49,660

inside the chamber right now at ambient temperature weighs about as much as 12

26
00:01:49,680 --> 00:01:53,710
and a half Volkswagen Beetles, so about 25 tons

27
00:01:53,730 --> 00:01:57,790
so by tie you remove all the air and all the molecules out, all the mass inside the chamber is equivalent of about

28
00:01:57,810 --> 00:02:01,810
a staple. That's very rough, but you

29
00:02:01,830 --> 00:02:05,880
kind of put it in perspective of what we are doing.

30
00:02:05,900 --> 00:02:09,920
[sound of door closing]

31
00:02:09,940 --> 00:02:14,000
Chamber a was originally built as a simulation

32
00:02:14,020 --> 00:02:18,100
for the Apollo missions to test the Apollo capsule

33
00:02:18,120 --> 00:02:22,150
Back for Apollo, the chamber had to be ready to have

34
00:02:22,170 --> 00:02:26,190
people put into the chamber inside their vehicle, so it was

35
00:02:26,210 --> 00:02:30,200
man-rated. It still is man-rated, but we obviously

36
00:02:30,220 --> 00:02:34,250
don't need to put people on the telescope, so that's not much of a concern for us anymore

37
00:02:34,270 --> 00:02:38,280
what is a concern is that the telescope has have a very clean environment

38
00:02:38,300 --> 00:02:42,300

because it's an optical telescope. Actually, right where I'm standing right now,

39

00:02:42,320 --> 00:02:46,320

several feet back and all the way to the chamber and all the way to both sides of the highbay

40

00:02:46,340 --> 00:02:50,380

we're going to be installing a very large clean room that will allow

41

00:02:50,400 --> 00:02:54,410

engineers and technicians to work on the satellite as they are prepping it to go into

42

00:02:54,430 --> 00:02:58,430

the chamber.

43

00:02:58,450 --> 00:03:02,440

During the final flight test of James Webb

44

00:03:02,460 --> 00:03:06,470

it will be in the chamber for, we're anticipating 90 days

45

00:03:06,490 --> 00:03:10,500

The first, roughly 30 of those days

46

00:03:10,520 --> 00:03:14,510

we will not be doing anything more than cooling it down

47

00:03:14,530 --> 00:03:18,610

because its got to radiate all its heat out to those cold shroud

48

00:03:18,630 --> 00:03:22,670

walls, it will take a long time for it to drift down to its eventual

49

00:03:22,690 --> 00:03:26,680

operating temperature. Then for the next period of weeks they will be running

50

00:03:26,700 --> 00:03:30,710

tests on the instrumentation systems and at the end

51

00:03:30,730 --> 00:03:34,950

it will take us about another two and a half, three weeks to warm it back up so we bring it back out

52

00:03:34,970 --> 00:03:39,010

into the Houston humidity

53

00:03:39,030 --> 00:03:43,130

Chamber is

54

00:03:43,150 --> 00:03:47,220

now the most capable thermal vacuum chamber on the planet