1
00:00:13,889 --> 00:00:18,630
The 18 segments making up the primary mirror
on the James Webb Space Telescope will be

2
00:00:18,630 --> 00:00:21,759
held in place by something called a backplane.

3
00:00:21,759 --> 00:00:25,380
Since there are 18 hexagonal mirrors, each
being about 3 feet tall.

4
00:00:25,380 --> 00:00:30,000
You can imagine the backplane is huge and
very complicated to make.

5
00:00:30,000 --> 00:00:36,040
To find out more about how it's being assembled,
we came to Magna, Utah and ATK and we're happy

6
00:00:36,040 --> 00:00:41,010
to have with us, Bob Hellickson, the Project
Manager for the James Webb Space Tele- scope.

7
00:00:41,010 --> 00:00:42,010
Thanks for having us over.

8
00:00:42,010 --> 00:00:43,800
Thanks for coming to visit us Mary.

9
00:00:43,800 --> 00:00:49,090
First of all, how tough a job is it to make
a backplane for the James Webb Space Telescope?

10
00:00:49,090 --> 00:00:54,059
Well, what we're standing in front of right
here, is three of the full scale hexes for

11
00:00:54,059 --> 00:00:58,679
the backplane and this was manufactured out

of wood that established both the tooling

12
00:00:58,679 --> 00:01:02,980
approach and the assem- bly approach for the
flight article.

13
00:01:02,980 --> 00:01:05,519
Now you didn't just go from this to the real
thing, did you?

14
00:01:05,519 --> 00:01:07,490
No, we did not as a matter of fact.

15
00:01:07,490 --> 00:01:09,730
This structure was the first, made out of
wood.

16
00:01:09,730 --> 00:01:14,660
Then this size, three hexes, was made out
of the graphite composite material.

17
00:01:14,660 --> 00:01:21,689
It was taken down to the 30 Kelvin level or
minus 405 degrees Fahrenheit and it was measured

18
00:01:21,689 --> 00:01:23,640
for its performance on stability.

19
00:01:23,640 --> 00:01:28,250
It has to stay very stable throughout that
entire temperature regime.

20
00:01:28,250 --> 00:01:32,689
So, Bob, I understand the real backplane is
here at ATK now?

21
00:01:32,689 --> 00:01:33,689
Oh absolutely!

22

00:01:33,689 --> 00:01:34,689
We can show you that.

23
00:01:34,689 --> 00:01:36,439
We'll have to go to the cleanroom next.

24
00:01:36,439 --> 00:01:43,009
I want to show you some electronic measuring
equipment to make sure everything meets its

25
00:01:43,009 --> 00:01:46,360
final dimensional performance before we deliver.

26
00:01:46,360 --> 00:01:50,610
So, is it like a GPS where it detects where
that position, where that ball is located

27
00:01:50,610 --> 00:01:51,690
at any given time?

28
00:01:51,690 --> 00:01:53,210
Yeah, that's exactly right.

29
00:01:53,210 --> 00:01:58,899
That ball coordinates back on its surface
to where the model is for the corresponding

30
00:01:58,899 --> 00:01:59,899
feature.

31
00:01:59,899 --> 00:02:01,210
This is very interesting stuff.

32
00:02:01,210 --> 00:02:02,370
The suspense is killing me.

33
00:02:02,370 --> 00:02:04,009
Can we see the backplane now?

34
00:02:04,009 --> 00:02:08,380
Bob: Absolutely, step around this side and
we'll show you the rest of it.

35
00:02:08,380 --> 00:02:09,380
Great.

36
00:02:09,380 --> 00:02:14,310
This is the center section of the backplane
and it will house 12 of the primary mirror

37
00:02:14,310 --> 00:02:15,310
segments.

38
00:02:15,310 --> 00:02:16,930
Mary: Now you said center section.

39
00:02:16,930 --> 00:02:18,570
It's not the whole thing?

40
00:02:18,570 --> 00:02:19,570
Correct.

41
00:02:19,570 --> 00:02:25,170
The full sized mirror will have 18 segments
and what's missing here, they'll come later...

42
00:02:25,170 --> 00:02:28,700
are two wings, each one holding 3 segments,
or 3 mirrors.

43
00:02:28,700 --> 00:02:31,480
And why break it out into a center and two
wings.

44
00:02:31,480 --> 00:02:32,780
The launch vehicles cannot...

45

00:02:32,780 --> 00:02:35,920
don't have the dimensions to accept the entire
width.

46
00:02:35,920 --> 00:02:37,230
So it has to fold up.

47
00:02:37,230 --> 00:02:42,500
And that's another unique feature here as
we're deploying three of the hexes on each

48
00:02:42,500 --> 00:02:43,910
side or on both wings.

49
00:02:43,910 --> 00:02:48,030
So, Bob, I noticed this isn't exactly a flat
structure.

50
00:02:48,030 --> 00:02:49,989
It's got a little bit of a curve.

51
00:02:49,989 --> 00:02:50,989
That's correct.

52
00:02:50,989 --> 00:02:55,180
The backplane matches the parabolic shape
they want the primary mirror to end up with

53
00:02:55,180 --> 00:02:56,180
so it's actually curved to match that desired
outcome.

54
00:02:56,180 --> 00:03:00,330
Besides holding the mirrors in place once
James Webb is in operation, what else in the

55
00:03:00,330 --> 00:03:01,380
back- plane for?

56

00:03:01,380 --> 00:03:06,530
The backplane also provides stability for
the entire observatory, so what's missing

57
00:03:06,530 --> 00:03:13,720
here, you'll see later is the backplane stability
frame, reaches about 8 feet off of this section.

58
00:03:13,720 --> 00:03:19,910
It will house the instruments for the observatory
and provides a lot of the strength for the

59
00:03:19,910 --> 00:03:21,680
launch.

60
00:03:21,680 --> 00:03:23,409
Well thanks for showing us ATK's backplane.

61
00:03:23,409 --> 00:03:26,440
Bob: Well, thanks for coming to visit us,
Mary.

62
00:03:26,440 --> 00:03:32,700
So, as you can see, this backplane will ultimately
be thermally and structurally stable.

63
00:03:32,700 --> 00:03:38,600
Im- portant for the 18 segment primary mirror
to stay still so that the James Webb Space

64
00:03:38,600 --> 00:03:42,209
Telescope can take it's wonderful images of
the universe.