

1  
00:00:13,289 --> 00:00:16,530  
Mary Estacion/Reporter: The primary mirror on the Webb telescope will have a diameter

2  
00:00:16,530 --> 00:00:18,880  
of more than 21 feet.

3  
00:00:18,879 --> 00:00:20,699  
That's 4 times my height.

4  
00:00:20,699 --> 00:00:25,149  
Now that's too big to fit into a rocket so engineers have had to design a structure that

5  
00:00:25,149 --> 00:00:30,769  
will not only hold all 18 segments of the primary mirror in place, but also fold up

6  
00:00:30,769 --> 00:00:32,189  
during launch.

7  
00:00:32,189 --> 00:00:36,939  
That's why we've come to ATK in Magna, Utah where they're building the wings of the backplane.

8  
00:00:36,939 --> 00:00:41,179  
Brian Jahne (Lead Design Engineer/ ATK): There's three deliverables that ATK provides.

9  
00:00:41,179 --> 00:00:45,750  
There's a left hand side wing, a right hand side wing and then a large center section

10  
00:00:45,750 --> 00:00:46,750  
portion.

11  
00:00:46,750 --> 00:00:49,619  
This design right here shows the wings in the deployed condition.

12  
00:00:49,619 --> 00:00:53,869  
When it's on top of the spacecraft prior to launch, they're folded back.

13  
00:00:53,869 --> 00:00:56,829  
There's 4 launch locks on the outboard corners  
of the wings.

14  
00:00:56,829 --> 00:00:58,350  
Mary: Ooo... what's a launch lock?

15  
00:00:58,350 --> 00:01:03,890  
Brian: A launch lock is what is used to hold  
the wing in its tight packed position.

16  
00:01:03,890 --> 00:01:06,409  
Mary: Oh, okay, so it keeps it in place during  
the launch.

17  
00:01:06,409 --> 00:01:07,409  
Brian: That's right.

18  
00:01:07,409 --> 00:01:11,810  
So, once it's out through the launch environment,  
the launch locks are released, the mirror

19  
00:01:11,810 --> 00:01:13,409  
can be deployed into the final position.

20  
00:01:13,409 --> 00:01:16,920  
Mary: So how far along are you in making these  
wings?

21  
00:01:16,920 --> 00:01:19,310  
Brian: We've very far along actually.

22  
00:01:19,310 --> 00:01:23,560  
You can go out and see the progress in the  
clean room with Ed Gaul.

23  
00:01:23,560 --> 00:01:27,549  
He'll take you on a little tour of the manufacturing  
facility and show you the wings.

24  
00:01:27,549 --> 00:01:28,829  
Mary: Hey Ed.

25  
00:01:28,829 --> 00:01:33,030

Brian just showed us the computer models of the backplane but he said that the wings of

26  
00:01:33,030 --> 00:01:35,090  
the backplane are actually almost done.

27  
00:01:35,090 --> 00:01:36,630  
Ed Graul (Manufacturing IPT Lead /ATK): That's really true.

28  
00:01:36,629 --> 00:01:41,539  
We've been quite a while on the wings and we're very close to having them being completed.

29  
00:01:41,540 --> 00:01:45,000  
You can see them working on them here in the background.

30  
00:01:45,000 --> 00:01:50,000  
Each of these wings goes on center section of the support structure.

31  
00:01:50,000 --> 00:01:53,390  
Each of the wings holds three of the mirror segments.

32  
00:01:53,390 --> 00:01:55,010  
Then they will fold up during launch.

33  
00:01:55,010 --> 00:01:56,820  
Mary: Any chance we can sneak in there?

34  
00:01:56,819 --> 00:01:58,729  
Ed: Well, I would love to show you.

35  
00:01:58,730 --> 00:02:03,460  
Let's get our clean garb on and we will be able to go in and have a closer look.

36  
00:02:03,459 --> 00:02:04,459  
Mary: Sounds good!

37  
00:02:04,459 --> 00:02:06,719  
Mary: So what are these guys doing now?

38  
00:02:06,719 --> 00:02:13,509  
Ed: They are bonding together different pieces  
that will make up the overall assembled structure.

39  
00:02:13,509 --> 00:02:20,489  
The thickness of the adhesive they are currently  
injecting in at very specific points has to

40  
00:02:20,490 --> 00:02:25,549  
be held very precisely because if there's  
too much adhesive, it'll want to pull itself

41  
00:02:25,549 --> 00:02:28,040  
apart at very cold temperatures.

42  
00:02:28,039 --> 00:02:32,888  
If there's too little adhesive, then it won't  
be able to withstand the forces of launch.

43  
00:02:32,889 --> 00:02:34,959  
Ed: Let's come around to the far side...

44  
00:02:34,959 --> 00:02:37,408  
Mary: Ok  
Ed: Now these wings... you can see first,

45  
00:02:37,408 --> 00:02:41,229  
as you look at it.. that the wings are not  
flat.

46  
00:02:41,229 --> 00:02:46,988  
They have a curve shape and that curved shape  
matches the parabolic shape of the overall

47  
00:02:46,989 --> 00:02:47,989  
mirror.

48  
00:02:47,989 --> 00:02:51,299  
Mary: So visually, each of the primary mirror  
segments would be facing down right now as

49  
00:02:51,299 --> 00:02:53,680  
opposed to be right on top here.

50

00:02:53,680 --> 00:02:55,040

Ed: That is correct.

51

00:02:55,039 --> 00:03:01,780

And you can see all along as you're in closer,  
that we have additional sheer panels that

52

00:03:01,780 --> 00:03:06,049

distribute and balance the loads that are  
experienced during launch.

53

00:03:06,049 --> 00:03:07,049

Mary: Great!

54

00:03:07,049 --> 00:03:09,968

Well, thank you so much for showing us the  
wings of the backplane.

55

00:03:09,968 --> 00:03:12,079

Ed: It's certainly my pleasure.

56

00:03:12,079 --> 00:03:13,459

Thank you for being here today.

57

00:03:13,459 --> 00:03:19,009

Mary: As you can see the backplane and its  
wings have to be very very strong because

58

00:03:19,009 --> 00:03:24,120

the mirror segments collectively weigh about  
three quarters of a ton.

59

00:03:24,120 --> 00:03:26,959

Thanks for joining us for this edition of  
Behind the Webb.