Behind the Webb Episode 18 - On the Wings of Webb

Mary: The primary mirror on the Webb telescope will have a diameter of more than 21 feet. That's 4 times my height. Now that's too big to fit into a rocket so engineers have had to design a structure that will not only hold all 18 segments of the primary mirror in place, but also fold up during launch. That's why we've come to ATK in Magna, Utah where they're building the wings of the backplane.

Brian Jahne (Lead Design Engineer/ ATK): There's three deliverables that ATK provides. There's
a left hand side wing. A right hand side wing and then a large center section portion.
This design right here shows the wings in the deployed condition. When it's on top of the spacecraft prior to launch, they're folded back.
There's 4 launch locks on the outboard corners of the wings.

Mary: Ooo… what's a launch lock?

B: A launch lock is what is used to hold the wing in its tight packed position.

M: Oh, okay, so it keeps it in place during the launch.

B: That's right. So, once it's out through the launch environment, the launch locks are
released, the mirror can be deployed into the final position.

M: So how far along are you in making these wings?

B: We've very far along actually. You can go out and see the progress in the clean room with Ed Graul. He'll take you on a little tour of the manufacturing facility and show you the wings.

M: Hey Ed. Brian just showed us the computer models of the backplane but he said that the wings of the backplane are actually almost done.

Ed Graul (Manufacturing IPT Lead /ATK): That's really true. We've been quite a while on
the wings and we're very close to having them being completed. You can see them working on them here in the background. Each of these wings goes on center section of the support structure. Each
of the wings holds three of the mirror segments. Then they will fold up during launch.

M: Any chance we can sneak in there?

E: Well, I would love to show you. Let's get our clean garb on and we will be able to go in and have a closer look.

M: Sounds good!

M: So what are these guys doing now?

E: They are bonding together different pieces that will make up the overall assembled structure. The thickness of the adhesive they are currently injecting in at very specific points has to be held very precisely because if there's too much adhesive, it'll want to pull itself apart
at very cold temperatures. If there's too little adhesive, then it won't be able to withstand the forces of launch.

E: Let's come around to the far side…

M: Ok

E: Now these wings… you can see first, as you look at it.. that the wings are not flat.
They have a curve shape and that curved shape matches the parabolic shape of the overall mirror.

M: So visually, each of the primary mirror segments would be facing down right now as opposed to be right on top here.

E: That is correct. And you can see all along as you're in closer, that

we have additional sheer panels that distribute and balance the loads that are experienced during launch.

M: Great! Well, thank you so much for showing us the wings of the backplane.

E: It's certainly my pleasure. Thank you for being here today.

M: As you can see the backplane and its wings have to be very very strong because the mirror segments collectively weigh about ¾ of a ton. Thanks for joining us for this edition of Behind the Webb.