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00:00:13,888 --> 00:00:18,629  
The 18 segments making up the primary mirror on the James Webb Space Telescope will be

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00:00:18,629 --> 00:00:21,759  
held in place by something called a backplane.

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00:00:21,759 --> 00:00:25,379  
Since there are 18 hexagonal mirrors, each being about 3 feet tall.

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00:00:25,379 --> 00:00:30,000  
You can imagine the backplane is huge and very complicated to make.

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00:00:30,000 --> 00:00:36,039  
To find out more about how it's being assembled, we came to Magna, Utah and ATK and we're happy

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00:00:36,039 --> 00:00:41,009  
to have with us, Bob Hellickson, the Project Manager for the James Webb Space Telescope.

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00:00:41,009 --> 00:00:42,009  
Thanks for having us over.

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00:00:42,009 --> 00:00:43,799  
Thanks for coming to visit us Mary.

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00:00:43,799 --> 00:00:49,089  
First of all, how tough a job is it to make a backplane for the James Webb Space Telescope?

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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

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00:00:54,058 --> 00:00:58,678  
the backplane and this was manufactured out of wood that established both the tooling

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

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00:01:02,979 --> 00:01:05,518  
Now you didn't just go from this to the real thing, did you?

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

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00:01:07,489 --> 00:01:09,729  
This structure was the first, made out of wood.

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00:01:09,730 --> 00:01:14,659  
Then this size, three hexes, was made out of the graphite composite material.

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00:01:14,659 --> 00:01:21,688  
It was taken down to the 30 Kelvin level or minus 405 degrees Fahrenheit and it was measured

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00:01:21,688 --> 00:01:23,639  
for its performance on stability.

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

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00:01:28,250 --> 00:01:32,688  
So, Bob, I understand the real backplane is here at ATK now?

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00:01:32,688 --> 00:01:33,688  
Oh absolutely!

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00:01:33,688 --> 00:01:34,688  
We can show you that.

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00:01:34,688 --> 00:01:36,438  
We'll have to go to the cleanroom next.

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00:01:36,438 --> 00:01:43,008  
I want to show you some electronic measuring equipment to make sure everything meets its

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00:01:43,009 --> 00:01:46,359

final dimensional performance before we deliver.

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00:01:46,359 --> 00:01:50,609

So, is it like a GPS where it detects where that position, where that ball is located

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00:01:50,609 --> 00:01:51,689

at any given time?

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00:01:51,689 --> 00:01:53,209

Yeah, that's exactly right.

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00:01:53,209 --> 00:01:58,899

That ball coordinates back on its surface to where the model is for the corresponding

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00:01:58,899 --> 00:01:59,899

feature.

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00:01:59,899 --> 00:02:01,210

This is very interesting stuff.

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00:02:01,209 --> 00:02:02,369

The suspense is killing me.

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00:02:02,370 --> 00:02:04,009

Can we see the backplane now?

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00:02:04,009 --> 00:02:08,379

Bob: Absolutely, step around this side and we'll show you the rest of it.

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00:02:08,379 --> 00:02:09,379

Great.

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00:02:09,379 --> 00:02:14,310

This is the center section of the backplane and it will house 12 of the primary mirror

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00:02:14,310 --> 00:02:15,310

segments.

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00:02:15,310 --> 00:02:16,930

Mary: Now you said center section.

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00:02:16,930 --> 00:02:18,569

It's not the whole thing?

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00:02:18,569 --> 00:02:19,569

Correct.

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00:02:19,569 --> 00:02:25,169

The full sized mirror will have 18 segments and what's missing here, they'll come later...

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00:02:25,169 --> 00:02:28,699

are two wings, each one holding 3 segments, or 3 mirrors.

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00:02:28,699 --> 00:02:31,479

And why break it out into a center and two wings.

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00:02:31,479 --> 00:02:35,919

The launch vehicles cannot... don't have the dimensions to accept the entire width.

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00:02:35,919 --> 00:02:37,229

So it has to fold up.

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00:02:37,229 --> 00:02:42,500

And that's another unique feature here as we're deploying three of the hexes on each

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00:02:42,500 --> 00:02:43,909

side or on both wings.

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00:02:43,909 --> 00:02:48,030

So, Bob, I noticed this isn't exactly a flat structure.

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00:02:48,030 --> 00:02:49,989

It's got a little bit of a curve.

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00:02:49,989 --> 00:02:50,989

That's correct.

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00:02:50,989 --> 00:02:55,180

The backplane matches the parabolic shape they want the primary mirror to end up with

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00:02:55,180 --> 00:02:56,180

so it's actually curved to match that desired outcome.

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00:02:56,180 --> 00:03:00,330

Besides holding the mirrors in place once James Webb is in operation, what else in the

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00:03:00,330 --> 00:03:01,380

back- plane for?

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00:03:01,379 --> 00:03:06,530

The backplane also provides stability for the entire observatory, so what's missing

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00:03:06,530 --> 00:03:13,719

here, you'll see later is the backplane stability frame, reaches about 8 feet off of this section.

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00:03:13,719 --> 00:03:19,909

It will house the instruments for the observatory and provides a lot of the strength for the

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00:03:19,909 --> 00:03:21,680

launch.

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00:03:21,680 --> 00:03:23,409

Well thanks for showing us ATK's backplane.

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00:03:23,408 --> 00:03:26,439

Bob: Well, thanks for coming to visit us, Mary.

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00:03:26,439 --> 00:03:32,699

So, as you can see, this backplane will ultimately be thermally and structurally stable.

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00:03:32,699 --> 00:03:38,599

Important for the 18 segment primary mirror to stay still so that the James Webb Space

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00:03:38,599 --> 00:03:42,209

Telescope can take it's wonderful images of  
the universe.

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00:03:42,209 --> 00:03:55,050

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