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00:00:01,760 --> 00:00:06,320

>> And now we're on location at the Johnson Space Center, here to talk with Monica Visinsky,

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00:00:06,320 --> 00:00:08,440

Public Affairs Officer Brandi Dean.

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00:00:08,440 --> 00:00:13,890

>> Hi. Welcome to Building 9, the space vehicle mockup facility here at Johnson Space Center.

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00:00:13,890 --> 00:00:17,030

And as Amiko said, we have with us today Monica Visinsky,

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00:00:17,030 --> 00:00:21,890

who is going to be telling us about a test that's going on here in the background.

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00:00:21,890 --> 00:00:24,060

Why don't you kind of take it from the top on what we're doing here.

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00:00:24,060 --> 00:00:30,110

>> What we're doing here is we are testing a air lock transfer device that we've developed.

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00:00:30,110 --> 00:00:35,190

So the Japanese model has a airlock that has a sliding table

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00:00:35,190 --> 00:00:38,510

that they would use to extend out experiments.

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00:00:38,510 --> 00:00:43,040

They've used it in the past to send out their small fine arm, and what we're going to use it

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00:00:43,040 --> 00:00:45,950

for is we're going to use it to
bring spares that are internal

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00:00:45,950 --> 00:00:50,680

in the pressurized volume outside, so
that the Dextrous robot can access it

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00:00:50,680 --> 00:00:53,750

and use that spare in maintenance activities.

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00:00:53,750 --> 00:00:56,740

>> Okay. So what we've got behind
us is the trainer that's used

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00:00:56,740 --> 00:00:59,510

for the special purpose Dextrous
manipulator, and Dextre,

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00:00:59,510 --> 00:01:01,160

which is what we normally like to call it.

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00:01:01,160 --> 00:01:06,520

But -- and that's used already to -- to
train -- change out spare parts, or ORUs --

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00:01:06,520 --> 00:01:08,360

orbital replacement units, right?

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00:01:08,360 --> 00:01:12,340

>> Yes. We've actually already
changed out this little tiny ORU,

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00:01:12,340 --> 00:01:15,400

which is the remote power controller module.

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00:01:15,400 --> 00:01:16,850

So we've done that repair on orbit.

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00:01:16,850 --> 00:01:21,940

And in the testing here we're evaluating testing all sorts of ORUs, including this small one,

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00:01:21,940 --> 00:01:26,040

and the big one that you see that they're maneuvering around back there,

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00:01:26,040 --> 00:01:30,780

as well as a variety of different shape ORUs, or boxes --

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00:01:30,780 --> 00:01:31,000

>> Right.

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00:01:31,000 --> 00:01:34,970

>> -- and different configurations --

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00:01:34,970 --> 00:01:35,080

>> Right.

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00:01:35,080 --> 00:01:35,840

>> -- of those boxes, so.

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00:01:35,840 --> 00:01:37,260

>> So kind of the problem we're trying

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00:01:37,260 --> 00:01:40,360

to solve here is we have the spare parts inside the station,

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00:01:40,360 --> 00:01:43,070

and we want to get them out, or bring failed ones in, right?

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00:01:43,070 --> 00:01:45,350

>> Right. With the retirement of the space shuttle,

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00:01:45,350 --> 00:01:48,500

we don't have a lot of EVA capability any more.

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00:01:48,500 --> 00:01:48,990

>> Space walk, yeah.

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00:01:48,990 --> 00:01:50,550

>> Space walk capability.

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00:01:50,550 --> 00:01:54,590

So this will enable us -- in fact they only have one space walk per year.

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00:01:54,590 --> 00:01:55,160

>> Mm-hmm.

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00:01:55,160 --> 00:01:58,590

>> And if the spare is inside, the robot can't get at it.

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00:01:58,590 --> 00:02:02,930

So what this will enable us to do is to bring those spares outside, the robot can use them

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00:02:02,930 --> 00:02:05,040

to do the maintenance activities throughout the year --

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00:02:05,040 --> 00:02:05,180

>> Mm-hmm.

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00:02:05,180 --> 00:02:07,210

>> -- not requiring the crew to come outside.

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00:02:07,210 --> 00:02:07,600

>> Okay.

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00:02:07,600 --> 00:02:08,560

>> Saves on time.

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00:02:08,560 --> 00:02:10,440
>> So how -- how will it work?

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00:02:10,440 --> 00:02:12,360
>> Well what happens, I have this little --

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00:02:12,360 --> 00:02:17,410
this is a half-scale mockup that
we have, and I'll hand that to you.

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00:02:17,410 --> 00:02:18,660
>> Yeah.

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00:02:18,660 --> 00:02:25,440
>> So inside the crew in their short sleeves
would assemble the transfer interface,

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00:02:25,440 --> 00:02:27,970
which is really a glorified clamp.

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00:02:27,970 --> 00:02:31,050
And this -- the silver part
represents the airlock table.

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00:02:31,050 --> 00:02:31,660
>> Okay.

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00:02:31,660 --> 00:02:36,330
>> So they would have it -- they would assemble
it, they'd move the walls into position based

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00:02:36,330 --> 00:02:38,740
on the ORU, or the box that's going in it.

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00:02:38,740 --> 00:02:45,240
This is a little Canadian mockup box
that we're using here, again half-scale.

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00:02:45,240 --> 00:02:49,920

And they would put the spare into the system, and then they would close the clamp.

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00:02:49,920 --> 00:02:51,140

>> Okay.

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00:02:51,140 --> 00:02:52,900

>> This would then extend outside.

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00:02:52,900 --> 00:02:54,040

>> Mm-hmm.

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00:02:54,040 --> 00:02:57,480

>> And once it's outside, the dextrous robot would fly in,

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00:02:57,480 --> 00:03:00,120

would grab the grasp fixture on the box.

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00:03:00,120 --> 00:03:00,950

>> Mm-hmm.

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00:03:00,950 --> 00:03:06,200

>> And then inside the crew would flip a switch, which would automatically pull this back,

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00:03:06,200 --> 00:03:10,660

and then the robot would pull that away and then go use it in the maintenance activity.

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00:03:10,660 --> 00:03:10,750

>> Okay.

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00:03:10,750 --> 00:03:10,820

>> So.

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00:03:10,820 --> 00:03:13,160

>> So that seems pretty straightforward.

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00:03:13,160 --> 00:03:13,520
>> Yes.

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00:03:13,520 --> 00:03:15,500
>> So what are you all working on here today?

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00:03:15,500 --> 00:03:17,780
What -- what -- well you
need to practice it I guess.

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00:03:17,780 --> 00:03:20,920
>> What we're testing here today is
-- we're still in the design phase.

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00:03:20,920 --> 00:03:26,230
We're past the preliminary design and
working towards the critical design.

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00:03:26,230 --> 00:03:29,020
And what we're testing is
the ability of the operators

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00:03:29,020 --> 00:03:32,750
to use the visual cues that are on the device --

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00:03:32,750 --> 00:03:33,710
>> Mm-hmm.

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00:03:33,710 --> 00:03:38,330
>> -- and the natural features of the boxes to
see if they can actually align enough to get it

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00:03:38,330 --> 00:03:41,290
in there, and to make sure that
it's encaged when it's closed.

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00:03:41,290 --> 00:03:44,990
>> Okay. So I guess for people

who watch NASA TV a lot, when --

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00:03:44,990 --> 00:03:47,420

when we see the robotic operation,
it usually has kind of a little --

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00:03:47,420 --> 00:03:50,370

a bulls-eye or target on it that
it uses to pick it up, right?

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00:03:50,370 --> 00:03:52,340

>> Right. And in this case we don't.

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00:03:52,340 --> 00:03:57,200

Because for one, when you're going
to insert the ORU, there's --

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00:03:57,200 --> 00:04:01,750

a lot of times the end effector -- the end
of the arm is looking at the box itself,

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00:04:01,750 --> 00:04:04,920

so it can't see anything around it but the box.

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00:04:04,920 --> 00:04:11,160

We're using the external cameras, a couple
that are on the robot itself, on the large arm,

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00:04:11,160 --> 00:04:16,250

and ones that are on station and on the
Japanese facility to look at the worksite.

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00:04:16,250 --> 00:04:21,970

And all of those cameras are positioned where
they are, so they may be at a slight angle

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00:04:21,970 --> 00:04:25,570

to the worksite, or looking like
over the shoulder of the robot,

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00:04:25,570 --> 00:04:27,250

so the robot's partially blocking the view.

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00:04:27,250 --> 00:04:27,930

>> Mm-hmm.

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00:04:27,930 --> 00:04:33,180

>> So what we're testing here is whether the operator can still interpret the cues correctly

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00:04:33,180 --> 00:04:34,800

to get the box into the center.

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00:04:34,800 --> 00:04:36,860

>> And you've been doing a couple of weeks of testing now, right?

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00:04:36,860 --> 00:04:37,390

How's -- how's it going?

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00:04:37,390 --> 00:04:38,540

>> Yeah, we started last week.

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00:04:38,540 --> 00:04:39,800

It's going pretty well.

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00:04:39,800 --> 00:04:43,380

We've had some learning experiences as we've gone.

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00:04:43,380 --> 00:04:48,840

We've actually added some visual markings onto the various pieces of the interface

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00:04:48,840 --> 00:04:55,050

to help improve their ability to align and see the information that they need to see.

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00:04:55,050 --> 00:05:01,160

And we've had some more interesting experiences.

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00:05:01,160 --> 00:05:05,310

We had one box that's actually a very large box -- we don't actually have a --

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00:05:05,310 --> 00:05:09,390

a real representation of -- of it here, we're using the one that we have

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00:05:09,390 --> 00:05:14,390

in the grippers right now as a volumetric representation of it.

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00:05:14,390 --> 00:05:20,500

But it's so big that it has a very tight clearance when it goes into this interface.

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00:05:20,500 --> 00:05:26,910

So what we end up doing is aligning very precisely up at the top, and coming in.

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00:05:26,910 --> 00:05:28,010

>> Mm-hmm.

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00:05:28,010 --> 00:05:32,820

>> And there was one run where he thought he couldn't tell based on the views.

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00:05:32,820 --> 00:05:36,340

So he actually stopped above and said I can't go any farther.

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00:05:36,340 --> 00:05:36,850

>> Oh really?

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00:05:36,850 --> 00:05:37,210

>> Yeah.

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00:05:37,210 --> 00:05:41,240

>> Okay. So -- so there's a few --
few things to work out I guess --

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00:05:41,240 --> 00:05:41,360

>> Yes.

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00:05:41,360 --> 00:05:44,120

>> -- before -- it's probably
still a while before you get --

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00:05:44,120 --> 00:05:45,370

get it up on orbit or anything.

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00:05:45,370 --> 00:05:47,980

>> Well actually they're planning to
launch it at the beginning of next year.

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00:05:47,980 --> 00:05:48,560

>> Oh, okay.

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00:05:48,560 --> 00:05:49,410

So not so far away.

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00:05:49,410 --> 00:05:50,530

>> Yeah, not so far away.

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00:05:50,530 --> 00:05:52,700

>> Is that pretty exciting to be
working on something that's --

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00:05:52,700 --> 00:05:52,890

>> It is.

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00:05:52,890 --> 00:05:53,710

>> -- going up in space?

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00:05:53,710 --> 00:05:55,110

>> It is, actually.

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00:05:55,110 --> 00:05:58,420

And actually the -- the immediacy of it is exciting too.

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00:05:58,420 --> 00:06:00,030

We already have people that want to use it --

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00:06:00,030 --> 00:06:00,340

>> Oh yeah?

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00:06:00,340 --> 00:06:02,840

>> -- payloads that want to use it to bring out new components --

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00:06:02,840 --> 00:06:03,480

>> Mm-hmm.

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00:06:03,480 --> 00:06:06,200

>> -- swap out components on their payloads to extend their life.

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00:06:06,200 --> 00:06:08,110

>> Yeah. Bet people can think of a lot of uses for that.

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00:06:08,110 --> 00:06:08,910

>> Yeah.

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00:06:08,910 --> 00:06:11,690

>> And it's good -- I'm -- we were talking earlier about having ways --

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00:06:11,690 --> 00:06:13,950

ways we're finding to use that airlock, right?

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00:06:13,950 --> 00:06:14,390

>> Yes.

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00:06:14,390 --> 00:06:16,490

>> And I guess it's pretty international.

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00:06:16,490 --> 00:06:17,630

>> It is very international.

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00:06:17,630 --> 00:06:23,690

So the -- the airlock itself is a Japanese, the robot and the -- all the robots are Canadian,

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00:06:23,690 --> 00:06:28,410

and then NASA is helping with the -- the design of the system itself.

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00:06:28,410 --> 00:06:30,850

>> Is that interesting, working with all those different parts?

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00:06:30,850 --> 00:06:31,320

>> It is.

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00:06:31,320 --> 00:06:32,210

>> Yeah.

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00:06:32,210 --> 00:06:39,600

>> It's very -- all of the groups are very intelligent, and, you know,

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00:06:39,600 --> 00:06:42,440

very -- very good workers I guess.

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00:06:42,440 --> 00:06:45,800

And it's -- it's always been nice to work with all of them, so.

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00:06:45,800 --> 00:06:48,940

>> Yeah. What's -- what's the next step for you all?

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00:06:48,940 --> 00:06:52,150

>> The next step is actually that critical design review that I mentioned earlier.

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00:06:52,150 --> 00:06:57,140

So once we get this testing finished, we will evaluate from all

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00:06:57,140 --> 00:06:59,670

of the testing what cues we really want to implement --

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00:06:59,670 --> 00:07:00,160

>> Mm-hmm.

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00:07:00,160 --> 00:07:04,110

>> -- and we will work that into the design, and then aim for the critical design review.

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00:07:04,110 --> 00:07:08,620

And hopefully at that point we will hand it over and be able to manufacture it and build it.

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00:07:08,620 --> 00:07:09,620

>> Well good luck.