
#AskNASA
HOW DO YOU
BUILD A
MARS
ROVER?

1
00:00:02,720 --> 00:00:04,799
Hii
my name is Michelle Colizzi. I just

2
00:00:04,799 --> 00:00:07,040
finished building a spacecraft that's
going to Mars.

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00:00:07,040 --> 00:00:17,920
This is Ask NASA and I'm here to answer
your questions.

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00:00:21,600 --> 00:00:26,160
As humans we're naturally curious
right? We're natural born explorers it's

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00:00:26,160 --> 00:00:30,800
in our curiosity that we want to explore
outside of Earth and explore Mars,

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00:00:30,800 --> 00:00:34,079
understand what type of resources they
have,

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00:00:34,079 --> 00:00:39,120
can it sustain human life. Personally my
biggest worry is just making sure that

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00:00:39,120 --> 00:00:43,520
the pieces that I designed and i worked
on work.

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00:00:43,520 --> 00:00:47,360
We've gone through extensive testing and
it's become your child and you just want

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00:00:47,360 --> 00:00:52,640
to see it do its best when it gets to
to perform on the surface of Mars.

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00:00:52,640 --> 00:00:55,840
So there are a lot of really cool
instruments on board the Perseverance

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00:00:55,840 --> 00:00:58,399
rover.
One in particular that happens to be my

13
00:00:58,399 --> 00:01:03,359
favorite is MOXIE.
and the purpose of MOXIE is to try to

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00:01:03,359 --> 00:01:07,920
take some of the Mars atmosphere
and convert that into oxygen and the

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00:01:07,920 --> 00:01:13,200
oxygen - the pure oxygen - can be used
to generate fuel for a return flight

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00:01:13,200 --> 00:01:17,840
home in the future from Mars,
or could also be utilized for humans

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00:01:17,840 --> 00:01:21,840
breathing air when we do have manned
missions.

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00:01:23,280 --> 00:01:26,799
I think the biggest challenge is making
sure that you're

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00:01:26,799 --> 00:01:31,680
setting up your tests to
represent the environments that they're

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00:01:31,680 --> 00:01:34,560
going to see. There's a very large
temperature gradient

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00:01:34,560 --> 00:01:39,439
from the floor up to the top of the
rover. We have a chamber that simulates

22
00:01:39,439 --> 00:01:44,320
the heat and the radiation from the Sun
so we need to make sure that all the

23
00:01:44,320 --> 00:01:46,320
hardware and components that are on
there

24
00:01:46,320 --> 00:01:49,680
can withstand a wide range of
temperatures. We get

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00:01:49,680 --> 00:01:53,360
wind on Mars which blows up dust so we
veered away

26
00:01:53,360 --> 00:01:57,920
from solar panels to power the rover. And
the atmosphere that we'll see

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00:01:57,920 --> 00:02:03,439
on the journey to and on another planet
are very important.

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00:02:04,079 --> 00:02:08,800
I joined the ATLO team which is
assembly test and launch operations

29
00:02:08,800 --> 00:02:12,800
and that's where all the piece parts of
the hardware that all the individual

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00:02:12,800 --> 00:02:18,319
engineers have designed built and tested
come together. And we as the ATLO team

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00:02:18,319 --> 00:02:23,040
put all those pieces together to build
the spacecraft. I was responsible for

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00:02:23,040 --> 00:02:26,560
building the aeroshell,
and the aeroshell consists of a back

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00:02:26,560 --> 00:02:29,680
shell on the top
and a heat shield on the bottom and

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00:02:29,680 --> 00:02:34,840
that's the capsule
that the rover and the descent stage sit

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00:02:34,840 --> 00:02:37,840
inside.

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00:02:40,959 --> 00:02:44,879
The Ingenuity is mainly a proof of
concept to test new technology on the

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00:02:44,879 --> 00:02:48,239
surface of Mars,
right, we've never flown anything on

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00:02:48,239 --> 00:02:50,080
another planet before, so this will be
the first

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00:02:50,080 --> 00:02:53,680
time that we do. And it's also going to
give us some really cool aerial

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00:02:53,680 --> 00:02:57,840
shots from up above and allow us to see
the terrain ahead

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00:02:57,840 --> 00:03:01,519
for the Perseverance rover. So the
Ingenuity helicopter

42
00:03:01,519 --> 00:03:04,640
is actually stored at the bottom of the
rover underneath,

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00:03:04,640 --> 00:03:10,800
we have what's called a belly pan
that ejects with pyrotechnic devices

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00:03:10,800 --> 00:03:16,879
to then allow the helicopter to drop
onto the surface and stand up once the

45
00:03:16,879 --> 00:03:22,319
rover drives away.
And then it'll take flight from there

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00:03:22,319 --> 00:03:26,400
So they're more like robot brothers, but
they serve

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00:03:26,400 --> 00:03:30,879
- they're both stationed on two
totally different

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00:03:30,879 --> 00:03:35,040
locations on the surface of Mars and as
slow as they go,

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00:03:35,040 --> 00:03:38,239
i don't think it's very likely that
they'll ever meet up.

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00:03:38,239 --> 00:03:42,080
But they both have
very important but different

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00:03:42,080 --> 00:03:46,000
jobs to do on the surface of Mars. So
Perseverance has

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00:03:46,000 --> 00:03:50,159
this really cool robotic arm and at the
the end of the robotic arm it has a

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00:03:50,159 --> 00:03:53,360
drill
and a bunch of different drill bits, so

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00:03:53,360 --> 00:03:58,159
based on
the type of dirt or rock that we want to

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00:03:58,159 --> 00:04:01,360
to take samples of, it selects the right
bit.

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00:04:01,360 --> 00:04:04,799
And then it starts drilling these these
samples that will be,

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00:04:04,799 --> 00:04:08,080
we call them core samples. So they're
these little slender

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00:04:08,080 --> 00:04:11,200
core samples from the dirt that get
put

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00:04:11,200 --> 00:04:17,600
into a test tube looking
metallic tube, and then sealed airtight

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00:04:17,600 --> 00:04:22,000
so that we can preserve the sample for
when we do come and pick them back

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00:04:22,000 --> 00:04:28,000
up. I think the name Perseverance has
been very suiting

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00:04:28,000 --> 00:04:31,040
and has been - has hit really close to
home for me,

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00:04:31,040 --> 00:04:34,640
because everyone who worked on it did
have to persevere

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00:04:34,640 --> 00:04:40,160
in order to make this mission
a reality. This year there's support from

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00:04:40,160 --> 00:04:42,400
other countries who help build
instruments,

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00:04:42,400 --> 00:04:46,400
from colleges from we have interns and
co-ops we have scientists we have

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00:04:46,400 --> 00:04:49,759
engineers. I mean
there's so many people who come together

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00:04:49,759 --> 00:04:54,639
to make a mission like this happen.
I'm honored to be a part of this team

69
00:04:54,639 --> 00:04:57,280
who have built something absolutely
amazing,

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00:04:57,280 --> 00:05:01,840
and that's traveling to another planet. Like how cool is that?