Marshall is Powering the Future of Space Exploration

1
00:00:00,166 --> 00:00:04,471
Welcome to NASA's Marshall Space
Flight Center in Huntsville, Alabama.

2
00:00:04,738 --> 00:00:08,341
Developing new technologies
and maturing proven systems are at

3
00:00:08,341 --> 00:00:12,045
the core of how Marshall is powering
the future of space exploration.

4
00:00:12,412 --> 00:00:16,750
Marshall's test area is critical
for ensuring engines, engine components,

5
00:00:16,750 --> 00:00:19,986
thrusters and custom designed test
fixtures can withstand

6
00:00:19,986 --> 00:00:24,457
the extreme forces of launch ascent
on flights and travel in space.

7
00:00:24,791 --> 00:00:29,529
Our test area capabilities are also used
by NASA partners to mature, innovative

8
00:00:29,529 --> 00:00:33,967
technologies developed by American
industry to support space exploration.

9
00:00:34,234 --> 00:00:37,103
These test areas were invaluable
when analyzing hardware

10
00:00:37,103 --> 00:00:38,371
for the space launch system.

11

00:00:38,371 --> 00:00:40,507
Rocket managed by Marshall

12
00:00:40,507 --> 00:00:43,943
We built a new state of the art
stands to test the liquid hydrogen

13
00:00:43,943 --> 00:00:47,013
tank and liquid oxygen
tank for the art of its missions.

14
00:00:47,781 --> 00:00:51,084
Our in-house work to assemble
and apply thermal foam protection

15
00:00:51,084 --> 00:00:52,318
to the space launch system.

16
00:00:52,318 --> 00:00:55,321
Launch Vehicle Stage
Adapter is just one example of how

17
00:00:55,321 --> 00:00:58,458
our facilities
and engineering skills can support current

18
00:00:58,458 --> 00:01:02,429
and future NASA needs Marshall Facilities
and the people that work in them

19
00:01:02,462 --> 00:01:05,732
are supporting technologies
such as in-space storage

20
00:01:05,732 --> 00:01:10,136
and transfer of cryogenic propellants
used for deep space travel transits.

21
00:01:10,170 --> 00:01:11,771
Systems for getting to and off

22
00:01:11,771 --> 00:01:15,875
Mars, and lunar systems for traveling,
working and staying on the moon.

23
00:01:16,142 --> 00:01:19,245
We are using the knowledge
we've gained from our Lunar Lander TestBed

24
00:01:19,245 --> 00:01:22,449
programs
as we work with multiple industry partners

25
00:01:22,482 --> 00:01:26,419
to design, develop, test
and deliver human rated lunar landers.

26
00:01:26,753 --> 00:01:29,556
Marshall leads
the Human Landing System Program,

27
00:01:29,722 --> 00:01:33,526
which will return American astronauts
to the moon under Artemus.

28
00:01:33,927 --> 00:01:37,330
Not only is Marshall integral
in landing humans back on the moon,

29
00:01:37,464 --> 00:01:40,366
we are also maturing approaches
for Artemus Basecamp,

30
00:01:40,366 --> 00:01:43,503
surface habitats
and a Mars transit habitat

31
00:01:43,536 --> 00:01:47,574
to support surface operations on the moon
as a stepping stone to Mars.

32
00:01:47,774 --> 00:01:50,577
Years of work
developing environmental control

33
00:01:50,577 --> 00:01:53,480
and life support systems
for the International Space Station

34
00:01:53,480 --> 00:01:57,050
has prepared us for building
the systems needed for our next Great Leap

35
00:01:57,450 --> 00:02:00,487
living and working on the moon
and eventually Mars.

36
00:02:00,687 --> 00:02:02,122
Living and working on the moon.

37
00:02:02,122 --> 00:02:04,390
And one day Mars will require us to use

38
00:02:04,390 --> 00:02:07,227
the lessons we've learned
from the International Space Station.

39
00:02:07,560 --> 00:02:11,531
The Payload Operations Integration Center
Marshall supports the space station.

40
00:02:11,531 --> 00:02:12,866
24 hours a day.

41
00:02:12,866 --> 00:02:17,637
365 days a year, coordinating
all scientific experiments on the orbiting

42
00:02:17,637 --> 00:02:21,307

laboratory, hardware design built
and managed by Marshall,

43
00:02:21,407 --> 00:02:25,111
such as the four bed
CO2 scrubber, provide valuable data

44
00:02:25,111 --> 00:02:28,982
and state of the art support system
capabilities to help future explorers

45
00:02:28,982 --> 00:02:32,252
breathe easier on the moon
and future long duration missions.

46
00:02:32,585 --> 00:02:33,720
Going back to the moon

47
00:02:33,720 --> 00:02:37,423
and onto Mars requires
innovative solutions to many challenges.

48
00:02:37,624 --> 00:02:40,293
How do we repair tools
that have been broken on Mars?

49
00:02:40,560 --> 00:02:43,830
Is there a way we can manufacture
large structures in space?

50
00:02:44,097 --> 00:02:48,001
Engineers and scientists at Marshall's
advanced and additive manufacturing

51
00:02:48,001 --> 00:02:51,871
facility are doing work
to answer those questions and many more.

52
00:02:52,405 --> 00:02:56,242
Figuring out solutions to challenges

is what we do best at Marshall.

53
00:02:56,409 --> 00:03:00,480
Nowhere is that better demonstrated
than with our unique expertise in space

54
00:03:00,480 --> 00:03:01,981
nuclear technologies.

55
00:03:01,981 --> 00:03:04,984
This work comes to life
in our nuclear thermal lab

56
00:03:04,984 --> 00:03:09,122
with testing of concept designs, fuel
material developments, and manufacturing

57
00:03:09,122 --> 00:03:10,590
techniques that are critical

58
00:03:10,590 --> 00:03:14,227
for deep space exploration
and sending the first humans to Mars.

59
00:03:14,460 --> 00:03:17,263
Deep space
exploration also requires powerful

60
00:03:17,263 --> 00:03:20,600
spacecraft satellites
and in space observatories.

61
00:03:20,867 --> 00:03:24,137
Marshall's work with developing
X-ray mirrors and our optics lab

62
00:03:24,137 --> 00:03:27,240
has resulted in developing mirrors
for the James Webb telescope.

63
00:03:27,707 --> 00:03:29,876
And Imaging X-ray Telemetry Explorer.

64
00:03:30,176 --> 00:03:33,079
Turning our attention from the cosmos
to our own planet's

65
00:03:33,079 --> 00:03:36,583
atmosphere is a natural transition
for the scientists at Marshall.

66
00:03:36,683 --> 00:03:39,953
Programs like severe use, earth science,
satellite data

67
00:03:39,953 --> 00:03:44,157
to help countries across the globe
respond to challenges like food security,

68
00:03:44,190 --> 00:03:47,627
water resources,
climate change, and natural disasters.

69
00:03:47,827 --> 00:03:50,363
While other work through projects
like sports

70
00:03:50,363 --> 00:03:54,534
allow our scientific observations
to have a regional impact to improve short

71
00:03:54,534 --> 00:03:59,405
term weather forecasts from taking humans
farther into space than ever before,

72
00:03:59,472 --> 00:04:03,443
to developing technologies like 3D
printing and additive manufacturing

73

00:04:03,443 --> 00:04:06,813
and nuclear propulsion, to studying
climate change and weather patterns

74
00:04:07,046 --> 00:04:10,516
Marshall has the facilities
and capabilities that will continue

75
00:04:10,516 --> 00:04:13,486
to allow NASA
and our partners to explore space,