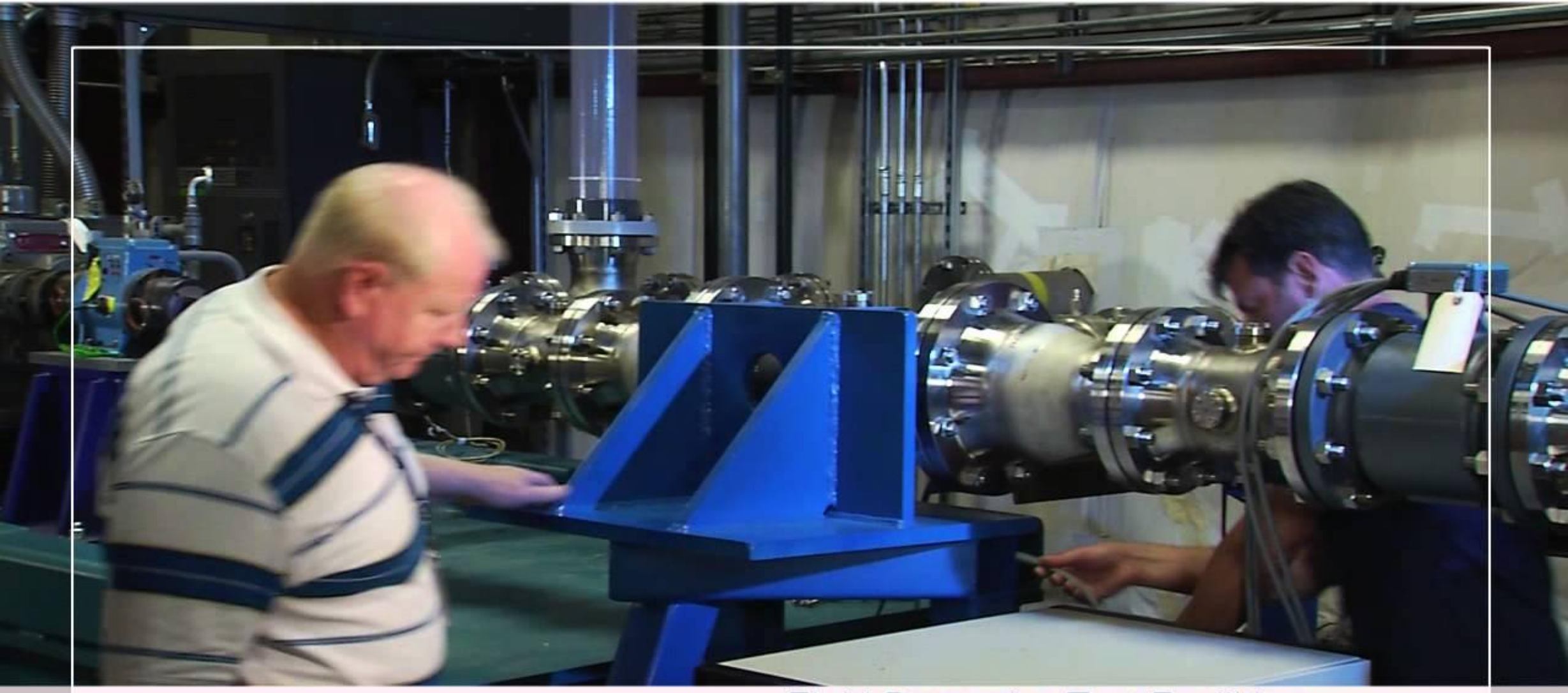

Fluid Dynamics Test Facilities

1
00:00:00,000 --> 00:00:08,800
Music full then under narration.

2
00:00:08,835 --> 00:00:15,103
The Marshall Space Flight

3
00:00:15,138 --> 00:00:17,151
Center has developed expertise

4
00:00:17,186 --> 00:00:19,087
and test facilities to simulate the

5
00:00:19,122 --> 00:00:20,512
space environment for the

6
00:00:20,547 --> 00:00:22,751
development, testing, analysis,

7
00:00:22,786 --> 00:00:24,562
qualification and acceptance

8
00:00:24,597 --> 00:00:27,023
testing of materials and space flight

9
00:00:27,058 --> 00:00:29,183
hardware. With this broad

10
00:00:29,218 --> 00:00:30,959
expertise and the variety of test

11
00:00:30,994 --> 00:00:33,376
systems, facilities and equipment

12
00:00:33,411 --> 00:00:35,327
available, Marshall is able to

13
00:00:35,362 --> 00:00:37,440

customize tests with a demonstrated

14
00:00:37,475 --> 00:00:39,376
ability to rapidly adapt

15
00:00:39,411 --> 00:00:41,216
and reconfigure systems to meet

16
00:00:41,251 --> 00:00:44,111
customer’s needs. You

17
00:00:44,146 --> 00:00:45,311
have to study the effects

18
00:00:45,346 --> 00:00:45,999
that the space

19
00:00:46,034 --> 00:00:47,567
environment has so you can

20
00:00:47,602 --> 00:00:48,383
see its effects on

21
00:00:48,418 --> 00:00:49,471
materials how fast these

22
00:00:49,506 --> 00:00:50,431
materials degrade and

23
00:00:50,466 --> 00:00:51,391
what their lifetime is.

24
00:00:51,426 --> 00:00:52,719
The effects that they

25
00:00:52,754 --> 00:00:54,432
have on space instruments

26
00:00:54,467 --> 00:00:58,079
so you can prevent any sort of breakdown

27
00:00:58,114 --> 00:00:58,928
degradation while it

28
00:00:58,963 --> 00:01:00,863
is in space. We want to

29
00:01:00,898 --> 00:01:01,535
find those things while

30
00:01:01,570 --> 00:01:03,007
we are on the ground.

31
00:01:03,042 --> 00:01:03,759
The environmental

32
00:01:03,794 --> 00:01:05,694
test systems, facilities and

33
00:01:05,729 --> 00:01:06,959
equipment combined with capabilities

34
00:01:06,994 --> 00:01:08,607
such as nondestructive

35
00:01:08,642 --> 00:01:11,087
evaluation, failure analysis, and

36
00:01:11,122 --> 00:01:13,119
mechanical testing, and space

37
00:01:13,154 --> 00:01:15,280
weather and natural environments-

38
00:01:15,315 --> 00:01:17,376

evaluation and modeling; makes

39
00:01:17,411 --> 00:01:18,319
Marshall a

40
00:01:18,354 --> 00:01:19,311
one-stop-shop for

41
00:01:19,346 --> 00:01:20,831
materials and flight hardware

42
00:01:20,866 --> 00:01:23,391
analysis. These capabilities are

43
00:01:23,426 --> 00:01:24,863
maintained and operated by

44
00:01:24,898 --> 00:01:26,255
highly trained and experienced

45
00:01:26,290 --> 00:01:28,416
personnel with a reputation for

46
00:01:28,451 --> 00:01:31,440
delivering what the customer needs.

47
00:01:31,475 --> 00:01:33,056
Capabilities at the center have

48
00:01:33,091 --> 00:01:34,559
been used in support of multiple

49
00:01:34,594 --> 00:01:36,975
NASA missions & programs from

50
00:01:37,010 --> 00:01:39,166
Space Shuttle to Chandra; from

51
00:01:39,201 --> 00:01:41,023
the International space Station

52
00:01:41,058 --> 00:01:43,087
to Solar Probe Plus, just to

53
00:01:43,122 --> 00:01:46,032
name a few. US Government agencies,

54
00:01:46,067 --> 00:01:48,144
including the Army, Air Force

55
00:01:48,179 --> 00:01:50,080
and Navy, seek the broad spectrum

56
00:01:50,115 --> 00:01:52,911
of test capabilities at Marshall.

57
00:01:52,946 --> 00:01:54,367
A wide range of commercial

58
00:01:54,402 --> 00:01:56,207
and academic customers come

59
00:01:56,242 --> 00:01:57,486
to Marshall for environmental

60
00:01:57,521 --> 00:01:59,311
testing. We provide

61
00:01:59,346 --> 00:02:00,559
simulated environments

62
00:02:00,594 --> 00:02:02,752
for qualification testing

63
00:02:02,787 --> 00:02:03,744

development testing

64
00:02:03,779 --> 00:02:05,632
acceptance testing of space

65
00:02:05,667 --> 00:02:08,144
flight hardware and materials.

66
00:02:08,179 --> 00:02:10,895
The Aerodynamic Research Facility

67
00:02:10,930 --> 00:02:13,583
is a 14” X 14” tri-sonic

68
00:02:13,618 --> 00:02:15,279
wind tunnel with a Mach range

69
00:02:15,314 --> 00:02:17,919
of 0.2 to 5. The fluid dynamics

70
00:02:17,954 --> 00:02:20,623
test facilities use both water

71
00:02:20,658 --> 00:02:22,960
flow and air flow as test media

72
00:02:22,995 --> 00:02:25,071
and test propulsion system

73
00:02:25,106 --> 00:02:27,199
components. Space Environmental Effects

74
00:02:27,234 --> 00:02:28,975
presents special challenges

75
00:02:29,010 --> 00:02:30,719
to those designing and building

76
00:02:30,754 --> 00:02:32,111
spacecraft. The

77
00:02:32,146 --> 00:02:33,759
aggregation of space environmental

78
00:02:33,794 --> 00:02:35,903
test capabilities at Marshall is

79
00:02:35,938 --> 00:02:37,632
the most complete set of capabilities

80
00:02:37,667 --> 00:02:39,664
in the agency ; allowing

81
00:02:39,699 --> 00:02:41,743
simultaneous exposures of multiple

82
00:02:41,778 --> 00:02:43,952
space environments. There

83
00:02:43,987 --> 00:02:45,200
are many test facilities

84
00:02:45,235 --> 00:02:46,367
that can only be found

85
00:02:46,402 --> 00:02:47,999
here at Marshall, from

86
00:02:48,034 --> 00:02:49,311
fluid dynamics testing

87
00:02:49,346 --> 00:02:50,399
for propulsion system

88
00:02:50,434 --> 00:02:52,239

components, to a Hydrometeor

89
00:02:52,274 --> 00:02:53,967
Impact Gun for measuring

90
00:02:54,002 --> 00:02:55,440
rain impact performance

91
00:02:55,475 --> 00:02:57,359
data. These test systems

92
00:02:57,394 --> 00:02:58,736
are unique within the

93
00:02:58,771 --> 00:03:00,128
Agency, and most are

94
00:03:00,163 --> 00:03:01,407
the only ones found in

95
00:03:01,442 --> 00:03:03,150
the United States. The

96
00:03:03,185 --> 00:03:04,239
latest addition to the

97
00:03:04,274 --> 00:03:06,159
test capabilities is HISET

98
00:03:06,194 --> 00:03:07,343
- the High Intensity Solar

99
00:03:07,378 --> 00:03:10,063
Environment Test. Bringing together

100
00:03:10,098 --> 00:03:12,271
elements of the solar space environment

101
00:03:12,306 --> 00:03:14,304
– including charged particles

102
00:03:14,339 --> 00:03:16,048
and concentrated sunlight – the

103
00:03:16,083 --> 00:03:18,097
HISET system is a revolutionary

104
00:03:18,132 --> 00:03:20,144
test platform designed to

105
00:03:20,179 --> 00:03:21,502
meet a wide range of testing

106
00:03:21,537 --> 00:03:23,694
challenges from spacecraft

107
00:03:23,729 --> 00:03:25,423
instrument qualification to high

108
00:03:25,458 --> 00:03:27,247
temperature terrestrial materials

109
00:03:27,282 --> 00:03:29,295
development. Designed with maximum

110
00:03:29,330 --> 00:03:31,567
flexibility in-mind, HISET

111
00:03:31,602 --> 00:03:33,616
offers customizable test solutions

112
00:03:33,651 --> 00:03:35,632
from single environment focused

113
00:03:35,667 --> 00:03:37,632

test conditions to complex combined

114
00:03:37,667 --> 00:03:40,015
environments. When spacecraft

115
00:03:40,050 --> 00:03:42,095
meets nature, the results can be

116
00:03:42,130 --> 00:03:44,255
disastrous unless the craft is

117
00:03:44,290 --> 00:03:46,655
designed and built to withstand harsh

118
00:03:46,690 --> 00:03:48,512
environments. By viewing the

119
00:03:48,547 --> 00:03:49,968
spacecraft and the environment as

120
00:03:50,003 --> 00:03:52,720
one system, Marshall experts

121
00:03:52,755 --> 00:03:54,447
know how to anticipate, avoid or

122
00:03:54,482 --> 00:03:56,718
overcome hardware anomalies

123
00:03:56,753 --> 00:03:58,607
to help ensure the needs of the

124
00:03:58,642 --> 00:04:01,727
mission are met. Marshall personnel

125
00:04:01,762 --> 00:04:03,327
have long-standing collaborative

126
00:04:03,362 --> 00:04:05,487
relationships throughout NASA

127
00:04:05,522 --> 00:04:07,376
Field Centers and the Department of

128
00:04:07,411 --> 00:04:08,992
Defense, always tapping into the

129
00:04:09,027 --> 00:04:11,232
expertise of their colleagues to

130
00:04:11,267 --> 00:04:13,263
help the success of spacecraft

131
00:04:13,298 --> 00:04:15,759
projects from design through launch

132
00:04:15,794 --> 00:04:17,423
to descent and landing, and orbital