1
00:00:18,150 --> 00:00:16,150
the structure of any hardware-based

2
00:00:20,150 --> 00:00:18,160
system serves as the backbone or

3
00:00:22,390 --> 00:00:20,160
framework of the whole system all

4
00:00:24,390 --> 00:00:22,400
components of a space hardware system

5
00:00:26,630 --> 00:00:24,400
must be supported in all expected

6
00:00:28,630 --> 00:00:26,640
operating environments by the system's

7
00:00:30,870 --> 00:00:28,640
underlying physical structure the

8
00:00:33,270 --> 00:00:30,880
marshall structural design and analysis

9
00:00:35,670 --> 00:00:33,280
capability is a complete set of methods

10
00:00:37,350 --> 00:00:35,680
and tools used to develop concepts to

11
00:00:40,229 --> 00:00:37,360
ensure the physical integrity of

12
00:00:42,869 --> 00:00:40,239
prototype development ground and flight

13
00:00:44,869 --> 00:00:42,879

hardware systems these capabilities make

14
00:00:47,670 --> 00:00:44,879
marshall the agency leader for launch

15
00:00:51,670 --> 00:00:47,680
vehicle earth to orbit in space staging

16
00:00:54,150 --> 00:00:51,680
thrusting and launch vehicle upper stage

17
00:00:56,310 --> 00:00:54,160
from the simplest payloads like cubesats

18
00:00:58,950 --> 00:00:56,320
to a complete vehicle architecture like

19
00:01:00,869 --> 00:00:58,960
the space launch system marshall offers

20
00:01:02,950 --> 00:01:00,879
the structural design and analysis

21
00:01:05,590 --> 00:01:02,960
capabilities we can carry it from

22
00:01:08,230 --> 00:01:05,600
conceptual design all the way through

23
00:01:10,469 --> 00:01:08,240
critical design even to production for

24
00:01:12,630 --> 00:01:10,479
space systems development

25
00:01:14,950 --> 00:01:12,640
structural design is a fundamental

26
00:01:17,270 --> 00:01:14,960
discipline of space flight every launch

27
00:01:19,510 --> 00:01:17,280
vehicle and spacecraft hardware system

28
00:01:21,990 --> 00:01:19,520
has a structure any organization

29
00:01:24,390 --> 00:01:22,000
developing launch vehicles spacecraft

30
00:01:26,149 --> 00:01:24,400
and payloads needs the capability to

31
00:01:27,350 --> 00:01:26,159
accomplish structural design and

32
00:01:29,510 --> 00:01:27,360
analysis

33
00:01:31,590 --> 00:01:29,520
marshall's expert structural designers

34
00:01:33,429 --> 00:01:31,600
and analysts continually seek to

35
00:01:35,030 --> 00:01:33,439
optimize the balance between the

36
00:01:37,270 --> 00:01:35,040
physical integrity of the system

37
00:01:39,270 --> 00:01:37,280
structure at the lowest practical weight

38
00:01:42,069 --> 00:01:39,280

while providing structural designs that

39
00:01:43,910 --> 00:01:42,079
can be affordably manufactured designers

40
00:01:46,230 --> 00:01:43,920
and analysts ensure the structural

41
00:01:49,030 --> 00:01:46,240
integrity of the system design in all

42
00:01:52,310 --> 00:01:49,040
expected environments including thrust

43
00:01:55,350 --> 00:01:52,320
accelerations bending forces thermal and

44
00:01:57,670 --> 00:01:55,360
acoustic environments and ground ascent

45
00:01:59,910 --> 00:01:57,680
and space weather this full spectrum

46
00:02:02,630 --> 00:01:59,920
capability is enabled by an equally

47
00:02:05,350 --> 00:02:02,640
broad array of labs tools and most

48
00:02:07,670 --> 00:02:05,360
importantly expertise marshall's state

49
00:02:10,150 --> 00:02:07,680
of the art design and analysis software

50
00:02:13,670 --> 00:02:10,160
tools provide the ability to develop and

51
00:02:17,110 --> 00:02:13,680
analyze complex 3d models and schematics

52
00:02:19,589 --> 00:02:17,120
those tools include hypersizer a design

53
00:02:21,830 --> 00:02:19,599
analysis and optimization software for

54
00:02:25,110 --> 00:02:21,840
composite and metallic structures

55
00:02:27,670 --> 00:02:25,120
spaceclaim and nastran nasa's structural

56
00:02:30,390 --> 00:02:27,680
analysis software when it is time to go

57
00:02:32,309 --> 00:02:30,400
from software to hardware tools marshall

58
00:02:33,430 --> 00:02:32,319
has the facilities to support your

59
00:02:35,830 --> 00:02:33,440
project

60
00:02:38,309 --> 00:02:35,840
the mechanical development facility or

61
00:02:40,790 --> 00:02:38,319
mdf provides a safe controlled

62
00:02:43,830 --> 00:02:40,800
environment for assembly and evaluation

63
00:02:46,070 --> 00:02:43,840

of prototype hardware the mdf is used

64
00:02:48,470 --> 00:02:46,080
for breadboard buildups mechanical

65
00:02:50,790 --> 00:02:48,480
system checkouts and to develop hardware

66
00:02:52,710 --> 00:02:50,800
mock-ups this hardware can be produced

67
00:02:56,630 --> 00:02:52,720
by our extensive in-house rapid

68
00:03:00,149 --> 00:02:58,790
at our mechanical fabrication facility

69
00:03:02,229 --> 00:03:00,159
basically we

70
00:03:03,350 --> 00:03:02,239
develop real hardware

71
00:03:05,430 --> 00:03:03,360
we take

72
00:03:07,910 --> 00:03:05,440
from the design concept

73
00:03:10,390 --> 00:03:07,920
turn it into development hardware which

74
00:03:12,710 --> 00:03:10,400
then turns into test hardware which

75
00:03:14,470 --> 00:03:12,720
eventually becomes flight hardware

76
00:03:18,149 --> 00:03:14,480
so all of that type of machining takes

77
00:03:19,910 --> 00:03:18,159
place within our facilities

78
00:03:22,070 --> 00:03:19,920
complementing these software and

79
00:03:24,229 --> 00:03:22,080
mechanical development and fabrication

80
00:03:26,949 --> 00:03:24,239
assets are a unique assortment of

81
00:03:29,910 --> 00:03:26,959
capabilities like vibration thermal and

82
00:03:31,509 --> 00:03:29,920
thermal vacuum axial loading stands and

83
00:03:33,750 --> 00:03:31,519
acoustic chambers

84
00:03:36,070 --> 00:03:33,760
marshall delivers world-class structural

85
00:03:38,470 --> 00:03:36,080
design and analysis expertise and

86
00:03:40,630 --> 00:03:38,480
experience covering every phase of

87
00:03:43,270 --> 00:03:40,640
systems development and every type of

88
00:03:46,390 --> 00:03:43,280

mission for launch vehicles and in-space

89
00:03:48,869 --> 00:03:46,400
stages spacecraft and science payloads

90
00:03:51,430 --> 00:03:48,879
from nasa's earliest days marshall has

91
00:03:53,830 --> 00:03:51,440
supported the agency's goals from the

92
00:03:55,990 --> 00:03:53,840
saturn to the shuttle and today's space

93
00:03:58,789 --> 00:03:56,000
launch system the combination of

94
00:04:00,949 --> 00:03:58,799
software hardware and testing tools of

95
00:04:03,429 --> 00:04:00,959
structural design and analysis and the

96
00:04:05,509 --> 00:04:03,439
propulsion test labs facilities provide