



1
00:00:00,000 --> 00:00:01,724
Game Changing is about finding

2
00:00:01,759 --> 00:00:03,533
the transformative technologies.

3
00:00:03,568 --> 00:00:05,181
The ones that will enable new

4
00:00:05,216 --> 00:00:06,621
missions and new capabilities

5
00:00:06,656 --> 00:00:09,141
for the Agency. That disruptive

6
00:00:09,176 --> 00:00:12,405
technology, if you will. And,

7
00:00:12,440 --> 00:00:13,637
what we mean by game changing

8
00:00:13,672 --> 00:00:15,094
would be orders of magnitude

9
00:00:15,129 --> 00:00:17,054
of improvements, changing the

10
00:00:17,089 --> 00:00:19,325
way a thing is done or made.

11
00:00:19,360 --> 00:00:22,677
Significant decrease in mass

12
00:00:22,712 --> 00:00:24,733
and costs, things like that.

13
00:00:24,768 --> 00:00:26,461

Game Changing really means that

14

00:00:26,496 --> 00:00:27,981

we will have projects that have

15

00:00:28,016 --> 00:00:30,125

a big payoff. They also incur a

16

00:00:30,160 --> 00:00:31,878

big risk within the project.

17

00:00:31,913 --> 00:00:33,853

Our Composites Cryotank project

18

00:00:33,888 --> 00:00:36,381

is developing technologies in

19

00:00:36,416 --> 00:00:38,781

several area concurrently. We

20

00:00:38,816 --> 00:00:39,685

are looking at advanced

21

00:00:39,720 --> 00:00:41,037

materials, were looking at very

22

00:00:41,072 --> 00:00:42,813

advanced manufacturing

23

00:00:42,848 --> 00:00:45,173

processes. The design and

24

00:00:45,208 --> 00:00:47,550

analysis processes that we go

25

00:00:47,585 --> 00:00:49,974

through are of extremely high

26

00:00:50,009 --> 00:00:52,789

sophistication and fidelity.

27

00:00:52,824 --> 00:00:55,037

The composite cryotank project

28

00:00:55,072 --> 00:00:58,061

can really dramatically reduce

29

00:00:58,096 --> 00:00:59,629

the cost and reduce the weight

30

00:00:59,664 --> 00:01:01,702

of the tanks that are required

31

00:01:01,737 --> 00:01:03,574

for the heavy lift launch

32

00:01:03,609 --> 00:01:05,358

vehicles. The state of the art

33

00:01:05,393 --> 00:01:08,717

for tankage for launch vehicles

34

00:01:08,752 --> 00:01:10,869

today is aluminum or an

35

00:01:10,904 --> 00:01:12,469

advanced alloy, aluminum lithium

36

00:01:12,504 --> 00:01:14,237

alloy. The materials we are

37

00:01:14,272 --> 00:01:15,453

working with are composite

38

00:01:15,488 --> 00:01:17,485

materials. Composites are new

39

00:01:17,520 --> 00:01:19,526

but their really the materials

40

00:01:19,561 --> 00:01:21,262

of the future for aerospace.

41

00:01:21,297 --> 00:01:23,181

These are fairly large sized

42

00:01:23,216 --> 00:01:25,189

tanks, The 2.4 meter, we call

43

00:01:25,224 --> 00:01:27,205

that our little tank, but

44

00:01:27,240 --> 00:01:29,229

it's 8 foot diameter tank, a

45

00:01:29,264 --> 00:01:30,388

little over 8 foot diameter

46

00:01:30,423 --> 00:01:31,564

tank, so it's a fairly big

47

00:01:31,599 --> 00:01:32,869

tank. The 5 and a half meter

48

00:01:32,904 --> 00:01:35,869

is a large tank. We decided to

49

00:01:35,904 --> 00:01:37,069

test those here at Marshall

50

00:01:37,104 --> 00:01:38,221

because Marshall has the

51
00:01:38,256 --> 00:01:39,901
facilities to test large scale

52
00:01:39,936 --> 00:01:41,484
tanks and large scale

53
00:01:41,519 --> 00:01:43,085
structures and we have the

54
00:01:43,120 --> 00:01:45,197
experience to do that. So it

55
00:01:45,232 --> 00:01:47,756
was just a fit to get the tank

56
00:01:47,791 --> 00:01:49,077
made and manufactured and

57
00:01:49,112 --> 00:01:51,261
designed by Boeing, and then

58
00:01:51,296 --> 00:01:52,348
to do the testing here at

59
00:01:52,383 --> 00:01:54,085
Marshall. So the 2.4 meter tank

60
00:01:54,120 --> 00:01:55,789
as well as our 5.5 meter are

61
00:01:55,824 --> 00:01:58,645
built using new out-of autoclave

62
00:01:58,680 --> 00:02:00,397
material. And the 2.4 meter

63
00:02:00,432 --> 00:02:01,996

tank, the one that has already

64

00:02:02,031 --> 00:02:03,261
been manufactured, is the first

65

00:02:03,296 --> 00:02:05,636
successful fiber placed tank

66

00:02:05,671 --> 00:02:07,245
using this out-of-autoclave

67

00:02:07,280 --> 00:02:08,813
material. So both of our tanks

68

00:02:08,848 --> 00:02:10,373
are using out-of-autoclave

69

00:02:10,408 --> 00:02:12,917
processes. An autoclave is a

70

00:02:12,952 --> 00:02:15,093
very large oven that also

71

00:02:15,128 --> 00:02:16,509
provided pressure during the

72

00:02:16,544 --> 00:02:18,428
curing of our tanks. That is

73

00:02:18,463 --> 00:02:20,509
a large investment upwards of

74

00:02:20,544 --> 00:02:22,933
\$50 million or more. So we are

75

00:02:22,968 --> 00:02:24,837
developing our tanks to be

76

00:02:24,872 --> 00:02:26,189

designed outside of the

77

00:02:26,224 --> 00:02:27,517

autoclave. So instead of an

78

00:02:27,552 --> 00:02:28,517

autoclave, we are using a

79

00:02:28,552 --> 00:02:30,829

much cheaper oven cure. So

80

00:02:30,864 --> 00:02:32,221

Game Changing needs to be

81

00:02:32,256 --> 00:02:33,308

not providing an incremental

82

00:02:33,343 --> 00:02:34,380

benefit, so not providing a

83

00:02:34,415 --> 00:02:35,988

one percent weight savings

84

00:02:36,023 --> 00:02:37,037

or not providing a five

85

00:02:37,072 --> 00:02:38,157

percent weight savings.

86

00:02:38,192 --> 00:02:39,845

The composite cryotank is

87

00:02:39,880 --> 00:02:40,932

providing a forty percent

88

00:02:40,967 --> 00:02:42,421

weight savings. So that allows