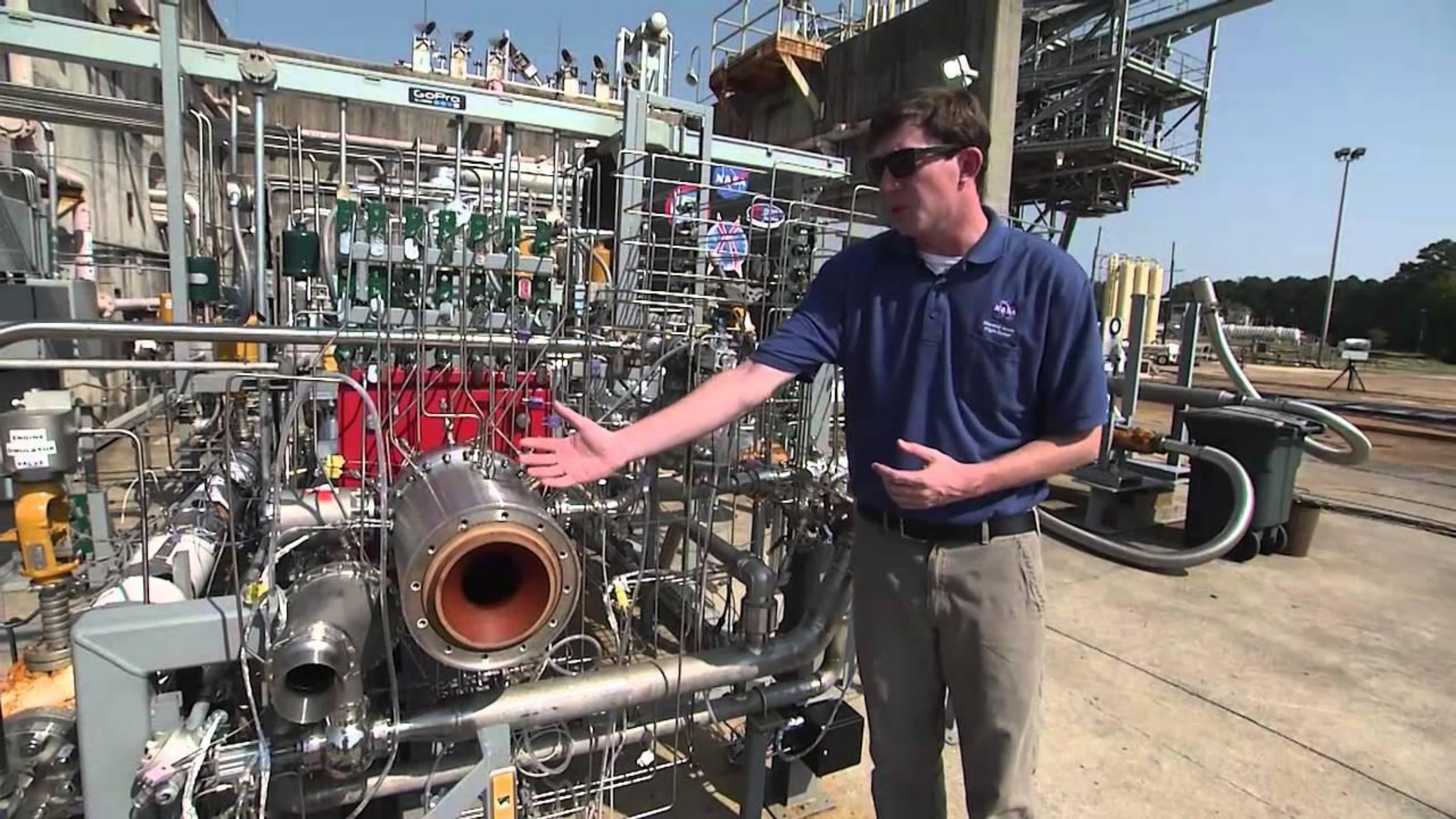
GoPro

1
00:00:03,169 --> 00:00:01,850
hi I'm Nick case and I work here at

2
00:00:05,329 --> 00:00:03,179
Marshall Space Flight Center in the

3
00:00:06,320 --> 00:00:05,339
propulsion systems department and today

4
00:00:08,089 --> 00:00:06,330
I'm going to talk to you about our

5
00:00:09,770 --> 00:00:08,099
additively manufactured demonstrator

6
00:00:12,680 --> 00:00:09,780
engine that we currently have built up

7
00:00:14,930 --> 00:00:12,690
here at testa and 116 this is what we

8
00:00:18,710 --> 00:00:14,940
call a breadboard engine configuration

9
00:00:20,990 --> 00:00:18,720
and so a lot of it is all spread out to

10
00:00:23,570 --> 00:00:21,000
give us more room to put instrumentation

11
00:00:26,060 --> 00:00:23,580
and specific sensors are trying to get

12
00:00:29,330 --> 00:00:26,070
as much data as we can on our added li

13
00:00:32,150 --> 00:00:29,340

manufacture parts and I'll start off

14
00:00:35,540 --> 00:00:32,160
with our our fuel turbopump so this pump

15
00:00:38,389 --> 00:00:35,550
is for liquid hydrogen and that is at

16
00:00:41,450 --> 00:00:38,399
minus 423 degrees Fahrenheit and it

17
00:00:45,200 --> 00:00:41,460
produces over 2,000 horsepower spins at

18
00:00:47,869 --> 00:00:45,210
90,000 rpm and the majority of all these

19
00:00:49,610 --> 00:00:47,879
parts here are added li manufactured the

20
00:00:52,340 --> 00:00:49,620
only things that we don't have our seals

21
00:00:54,770 --> 00:00:52,350
and bearings and we just completed 15

22
00:00:56,569 --> 00:00:54,780
tests on this this component and now

23
00:00:59,360 --> 00:00:56,579
we're ready to incorporate it into the

24
00:01:01,279 --> 00:00:59,370
engine over here we have our main fuel

25
00:01:03,680 --> 00:01:01,289
valve and so with this this valve does

26
00:01:06,230 --> 00:01:03,690
it allows the liquid hydrogen coming out

27
00:01:09,260 --> 00:01:06,240
of the turbo pump into our mixer which

28
00:01:11,719 --> 00:01:09,270
is also added li manufacture and we are

29
00:01:14,600 --> 00:01:11,729
able to mix liquid hydrogen and gaseous

30
00:01:16,999 --> 00:01:14,610
hydrogen together to send into our

31
00:01:19,039 --> 00:01:17,009
injector which is behind here that

32
00:01:21,530 --> 00:01:19,049
injector is also added li manufactured

33
00:01:23,359 --> 00:01:21,540
and it's one of the largest injectors

34
00:01:26,210 --> 00:01:23,369
that we've ever we've ever printed here

35
00:01:29,120 --> 00:01:26,220
at NASA on the back side of the injector

36
00:01:32,090 --> 00:01:29,130
is our ablative chamber and this will

37
00:01:35,600 --> 00:01:32,100
allow us to do a short duration test and

38
00:01:37,520 --> 00:01:35,610

it's a pretty cheap to make and and it

39
00:01:39,950 --> 00:01:37,530
helps us with schedule and so we'll use

40
00:01:42,560 --> 00:01:39,960
that for our first Test series we also

41
00:01:45,170 --> 00:01:42,570
have a regenitive Li cooled chamber that

42
00:01:47,600 --> 00:01:45,180
is being 3d printed right now that we'll

43
00:01:49,789 --> 00:01:47,610
use for our later Test series over here

44
00:01:52,999 --> 00:01:49,799
on the other side is our oxygen system

45
00:01:55,370 --> 00:01:53,009
and it starts with the the main oxidizer

46
00:01:57,289 --> 00:01:55,380
valve back here which is 3d printed we

47
00:01:59,149 --> 00:01:57,299
currently don't have a oxygen pump on

48
00:02:02,270 --> 00:01:59,159
the system that's currently being built

49
00:02:04,880 --> 00:02:02,280
right now we're using our pressurized

50
00:02:07,880 --> 00:02:04,890
tanks in the facility to provide our

51
00:02:10,430 --> 00:02:07,890
flow for the oxygen system downstream of

52
00:02:12,350 --> 00:02:10,440
that is our turbine bypass and turbine

53
00:02:13,809 --> 00:02:12,360
discharge valve which will take the

54
00:02:17,830 --> 00:02:13,819
gaseous hydrogen

55
00:02:21,250 --> 00:02:17,840
the turbine and discharge it out through

56
00:02:23,559 --> 00:02:21,260
this nozzle for for our test program and

57
00:02:25,809 --> 00:02:23,569
so this this valve and this this bowl

58
00:02:27,190 --> 00:02:25,819
are both 3d printed so overall this

59
00:02:30,160 --> 00:02:27,200
additively manufactured demonstrator

60
00:02:33,039 --> 00:02:30,170
engine contains over 75% additively

61
00:02:35,110 --> 00:02:33,049
manufactured parts for a future rocket

62
00:02:38,170 --> 00:02:35,120
engine design and we intended to test

63
00:02:39,879 --> 00:02:38,180

this breadboard engine for a total of 10

64
00:02:42,309 --> 00:02:39,889
tests and liquid hydrogen and liquid

65
00:02:43,959 --> 00:02:42,319
oxygen and in the future we'll do 10