1
00:00:05,269 --> 00:00:03,110
i remember when i worked for the

2
00:00:07,590 --> 00:00:05,279
american dental association so i

3
00:00:08,710 --> 00:00:07,600
remember telling people oh to design a

4
00:00:10,709 --> 00:00:08,720
material

5
00:00:12,629 --> 00:00:10,719
to uh to survive the oral environment is

6
00:00:15,430 --> 00:00:12,639
so challenging oh it's really tough

7
00:00:18,150 --> 00:00:15,440
there's abrasion prescription medication

8
00:00:20,070 --> 00:00:18,160
you have ice cream piping hot coffee 100

9
00:00:22,550 --> 00:00:20,080
degrees or more

10
00:00:25,589 --> 00:00:22,560
every 45 minutes we've got solar

11
00:00:28,150 --> 00:00:25,599
radiation x-rays thermal cycling atomic

12
00:00:30,470 --> 00:00:28,160
oxygen the uv radiation and the harsh

13
00:00:31,910 --> 00:00:30,480

vacuum of space

14
00:00:33,510 --> 00:00:31,920
and then

15
00:00:35,110 --> 00:00:33,520
i went to work for nasa and people ask

16
00:00:41,750 --> 00:00:35,120
me what i do and i say oh it's so

17
00:00:44,869 --> 00:00:43,670
hello ben reed materials engineering

18
00:00:46,069 --> 00:00:44,879
branch

19
00:00:47,430 --> 00:00:46,079
it depends on what the operating

20
00:00:51,510 --> 00:00:47,440
temperature is if you think you're going

21
00:00:53,670 --> 00:00:51,520
to be anywhere near -7 much of my job is

22
00:00:55,670 --> 00:00:53,680
failure analysis when this material

23
00:00:59,110 --> 00:00:55,680
fails in orbit like the outside of the

24
00:01:04,390 --> 00:01:01,910
it's basically being a detective

25
00:01:06,390 --> 00:01:04,400
my gosh how the heck are we gonna know

26
00:01:08,390 --> 00:01:06,400
what happened to this

27
00:01:10,870 --> 00:01:08,400
incredibly complicated instrument on

28
00:01:14,149 --> 00:01:10,880
this incredibly complicated satellite

29
00:01:15,830 --> 00:01:14,159
that's 250 miles in space going 18 000

30
00:01:18,070 --> 00:01:15,840
miles an hour that we're not going to

31
00:01:19,910 --> 00:01:18,080
get to for two or three years but you

32
00:01:22,630 --> 00:01:19,920
slowly pick away at the problem you got

33
00:01:24,789 --> 00:01:22,640
a lot of smart people who are going

34
00:01:26,630 --> 00:01:24,799
systematically checking off the list

35
00:01:30,469 --> 00:01:26,640
what is credible and non-credible i mean

36
00:01:35,990 --> 00:01:32,950
i started focusing on science and math

37
00:01:38,830 --> 00:01:36,000
in middle school and in in high school i

38
00:01:41,429 --> 00:01:38,840

went to college and got a degree in

39
00:01:42,550 --> 00:01:41,439
chemistry the thrill of being able to

40
00:01:44,310 --> 00:01:42,560
you know

41
00:01:47,510 --> 00:01:44,320
know have insight into what's really

42
00:01:49,429 --> 00:01:47,520
going on at the at the molecular level

43
00:01:51,670 --> 00:01:49,439
is just very exciting for me

44
00:01:53,590 --> 00:01:51,680
not just accepting that it happens but

45
00:01:56,310 --> 00:01:53,600
digging into it

46
00:01:58,870 --> 00:01:56,320
figuring out why

47
00:02:00,950 --> 00:01:58,880
my degree is in chemistry and i do a lot

48
00:02:04,310 --> 00:02:00,960
with chemistry with material science

49
00:02:07,030 --> 00:02:04,320
engineering with physics

50
00:02:10,309 --> 00:02:07,040
but more important than all of those is

51
00:02:13,110 --> 00:02:10,319
english let me look it up

52
00:02:14,070 --> 00:02:13,120
that i can find out in two minutes so

53
00:02:16,070 --> 00:02:14,080
let's see

54
00:02:17,830 --> 00:02:16,080
so if you cannot communicate

55
00:02:21,990 --> 00:02:17,840
your needs

56
00:02:25,589 --> 00:02:22,000
your opinions your engineering judgment

57
00:02:32,229 --> 00:02:29,670
engineering chemistry they all share the

58
00:02:35,509 --> 00:02:32,239
common goal of making sense

59
00:02:39,110 --> 00:02:35,519
being able to draw general conclusions

60
00:02:41,509 --> 00:02:39,120
from a host of individual examples