1
00:00:00,506 --> 00:00:06,626
[Music]

2
00:00:07,126 --> 00:00:08,676
Well, we're at Morton Arboretum.

3
00:00:08,676 --> 00:00:11,026
This is tree biomechanics
research.

4
00:00:11,386 --> 00:00:13,846
Trees are moving
constantly in the wind,

5
00:00:13,986 --> 00:00:15,406
and the whole objective is

6
00:00:15,406 --> 00:00:18,326
to understand really
when trees are safe.

7
00:00:19,026 --> 00:00:22,266
My friend, Mark Hoenigman who's
been doing tree work for me

8
00:00:22,266 --> 00:00:24,326
for years, he'd talk about some

9
00:00:24,326 --> 00:00:26,286
of the difficulties they
were having in trying

10
00:00:26,286 --> 00:00:28,106
to make measurements,

11
00:00:28,106 --> 00:00:29,606
displacement measurements,
on trees.

12
00:00:29,926 --> 00:00:32,606
And I said, hey, if you give me
a can of white paint and a can

13
00:00:32,606 --> 00:00:34,806
of black paint, I can come out
and I can show you how to do it.

14
00:00:34,806 --> 00:00:37,476
We can measure the deformation
of the whole tree all at once.

15
00:00:38,086 --> 00:00:41,396
We put a black and white
stucco pattern on these trees,

16
00:00:41,456 --> 00:00:43,446
and that stucco pattern
gets tracked

17
00:00:43,526 --> 00:00:45,496
by sets of stereo cameras.

18
00:00:45,646 --> 00:00:48,566
The fancy term is,
stereo photogrammetry

19
00:00:49,096 --> 00:00:53,786
that means we're using 3D images
of things to, in this case,

20
00:00:53,836 --> 00:00:58,206
trees, to track the movement
of that tree as it responds

21
00:00:58,296 --> 00:01:01,286
to forces of wind, or in
this case, our simulated wind

22

00:01:01,286 --> 00:01:03,646
by cabling the tree and
pulling on the cable.

23
00:01:03,916 --> 00:01:06,586
Those cameras look at the
same point of interest,

24
00:01:06,586 --> 00:01:08,816
and in this case, we're
looking at trees and roots.

25
00:01:09,466 --> 00:01:12,116
In looking at those things from
two different points of view,

26
00:01:12,916 --> 00:01:15,616
we're able to do
software calculations

27
00:01:15,756 --> 00:01:17,696
of the actual deformation
that's going on,

28
00:01:17,696 --> 00:01:21,936
and from that we can calculate
stress and strain that the trees

29
00:01:21,936 --> 00:01:22,976
or the roots are undergoing.

30
00:01:23,306 --> 00:01:26,476
We're employing some technology
on trees for the first time.

31
00:01:26,766 --> 00:01:28,816
And this technology has been
used in a lot of other things,

32
00:01:28,856 --> 00:01:31,436

specifically it was
developed with NASA

33
00:01:31,436 --> 00:01:34,256
for the Space Shuttle Program,
to look at the deformation

34
00:01:34,256 --> 00:01:36,626
of the surfaces of the
space shuttle if it gets hit

35
00:01:36,716 --> 00:01:39,586
by an object, which did cause
a serious problem for it.

36
00:01:39,896 --> 00:01:43,446
Obviously, this experiment
is destructive of trees but,

37
00:01:43,446 --> 00:01:46,286
we were able to choose
ash trees for this study,

38
00:01:46,286 --> 00:01:48,306
and they're going to
be gone soon anyway,

39
00:01:48,376 --> 00:01:50,696
so we're really not
harming good, useful trees.

40
00:01:51,166 --> 00:01:52,856
What's really interesting
is the fact

41
00:01:52,856 --> 00:01:54,646
that this has never been
done on trees before.

42
00:01:54,646 --> 00:01:56,716

I mean, it's groundbreaking
research in the fact that,

43
00:01:56,996 --> 00:01:58,686
you know, nobody really
understands how the,

44
00:01:58,686 --> 00:02:01,626
the full tree deforms
under this kind of loading.

45
00:02:02,166 --> 00:02:04,146
They want to understand
how trees fail.

46
00:02:04,146 --> 00:02:05,226
What makes them fail?

47
00:02:05,706 --> 00:02:07,946
And what we can do to
make them stronger.

48
00:02:08,136 --> 00:02:11,566
This is part of helping to
understand when trees are,

49
00:02:11,746 --> 00:02:15,016
are safe and sound, and when
trees may, may be a hazard,

50
00:02:15,016 --> 00:02:16,946
and need to be either
removed or,

51
00:02:17,266 --> 00:02:19,286
in some cases, braced
or reinforced.