ELECTRON BEAM FREEFORM FABRICATION

Large structures

Near net shapes

Not gravity dependent

1
00:00:00,000 --> 00:00:08,479
Music full then under narration.

2
00:00:08,514 --> 00:00:12,383
Marshall established the additive

3
00:00:12,418 --> 00:00:16,528
manufacturing lab in 1991, with

4
00:00:16,563 --> 00:00:18,336
the goal of finding low cost

5
00:00:18,371 --> 00:00:20,000
solutions to obsolete hardware

6
00:00:20,035 --> 00:00:21,920
issues at NASA and the Department

7
00:00:21,955 --> 00:00:24,384
of Defense. Since then Marshall

8
00:00:24,419 --> 00:00:25,935
has worked with other NASA centers,

9
00:00:25,970 --> 00:00:27,919
industries and universities on

10
00:00:27,954 --> 00:00:29,615
fabrication efforts that have

11
00:00:29,650 --> 00:00:31,679
led to innovations in affordability

12
00:00:31,714 --> 00:00:33,680
and produce ability; as well

13
00:00:33,715 --> 00:00:35,695

as unique geometry and less touch

14
00:00:35,730 --> 00:00:37,615
labor solutions. Part of what

15
00:00:37,650 --> 00:00:39,407
makes our shop unique is the

16
00:00:39,442 --> 00:00:40,944
experience; we've been working with

17
00:00:40,979 --> 00:00:43,711
the technology for 20 plus years.

18
00:00:43,746 --> 00:00:44,927
And they have only been invented

19
00:00:44,962 --> 00:00:47,823
for 24 so we were on the cutting

20
00:00:47,858 --> 00:00:49,408
edge when it first came out.

21
00:00:49,443 --> 00:00:51,087
Buying the first systems, we beta

22
00:00:51,122 --> 00:00:52,703
tested probably over 30 machines.

23
00:00:52,738 --> 00:00:54,959
But we have a keen understanding

24
00:00:54,994 --> 00:00:56,879
for how additive based, layer

25
00:00:56,914 --> 00:00:59,328
based manufacturing works. The

26
00:00:59,363 --> 00:01:02,878
lab utilizes a wide variety of

27
00:01:02,913 --> 00:01:05,215
machines. Each tailored for a

28
00:01:05,250 --> 00:01:07,919
specific need. Fused deposition

29
00:01:07,954 --> 00:01:09,583
modeling utilizes plastic wire

30
00:01:09,618 --> 00:01:12,032
that is extruded in thin slivers

31
00:01:12,067 --> 00:01:14,464
from a hot tip, fusing into shaped

32
00:01:14,499 --> 00:01:16,911
layers as the extrusion head moves

33
00:01:16,946 --> 00:01:18,288
to the geometry of the part being

34
00:01:18,323 --> 00:01:22,608
built. Stereo lithography uses a

35
00:01:22,643 --> 00:01:24,655
liquid bath of thermo-set resin t

36
00:01:24,690 --> 00:01:28,608
hat is cured by a laser beam. Electron

37
00:01:28,643 --> 00:01:31,408
beam freeform fabrication utilizes

38
00:01:31,443 --> 00:01:33,055

metal wire that is fed into a

39
00:01:33,090 --> 00:01:35,103
moving electron beam welder and forms

40
00:01:35,138 --> 00:01:37,407
up parts that are about 80% of the

41
00:01:37,442 --> 00:01:40,015
final shape; then machined to spec.

42
00:01:40,050 --> 00:01:45,888
Laser sintering and electron beam

43
00:01:45,923 --> 00:01:48,064
melting uses a directed energy

44
00:01:48,099 --> 00:01:50,672
source to melt shapes into a bed of

45
00:01:50,707 --> 00:01:53,200
powder. From aluminum to titanium,

46
00:01:53,235 --> 00:01:55,295
thus forming a solid full strength

47
00:01:55,330 --> 00:01:58,639
object directly. The additive lab

48
00:01:58,674 --> 00:02:00,847
has performed and documented numerous

49
00:02:00,882 --> 00:02:02,575
studies. Examining operation

50
00:02:02,610 --> 00:02:04,831
concepts and technology development

51
00:02:04,866 --> 00:02:07,344
plans. Marshall’s expertise in these

52
00:02:07,379 --> 00:02:09,520
various machines allow the additive

53
00:02:09,555 --> 00:02:11,471
manufacturing lab to identify

54
00:02:11,506 --> 00:02:13,886
components that will benefit from cost

55
00:02:13,921 --> 00:02:16,063
and schedule savings by using

56
00:02:16,098 --> 00:02:18,144
additive manufacturing over traditional

57
00:02:18,179 --> 00:02:20,352
manufacturing methods. It can really

58
00:02:20,387 --> 00:02:23,152
make your design to manufacturing

59
00:02:23,187 --> 00:02:25,135
process a lot more organic. It

60
00:02:25,170 --> 00:02:27,408
frees up the designers from thinking

61
00:02:27,443 --> 00:02:28,991
about how am I going to make

62
00:02:29,026 --> 00:02:33,407
this. We can print that. It’s a fun

63
00:02:33,442 --> 00:02:35,743

job, I got to say, it makes it worth