
FRUIT PUNCH AND FOAM
MANAGING LIQUIDS IN SPACE

1
00:00:00,780 --> 00:00:01,530
MARK STATION

2
00:00:01,530 --> 00:00:02,130
ON THREE.

3
00:00:02,130 --> 00:00:03,360
HOW TO HEAR, THIS IS DOUG.

4
00:00:05,760 --> 00:00:06,300
DOUG I GOT YOU.

5
00:00:06,330 --> 00:00:07,080
FIVE BY FIVE.

6
00:00:08,180 --> 00:00:11,780
WE STARTED MAYBE 15 YEARS AGO
IN THIS LONG LINE OF EXPERIMENTS

7
00:00:12,230 --> 00:00:15,320
THAT HAVE BEEN GOING TO SPACE
THAT ARE ALL SMALL SCALE FLUIDS

8
00:00:15,320 --> 00:00:18,020
EXPERIMENTS THAT HAVE REALLY
TAUGHT US A LOT ABOUT MANAGING

9
00:00:18,020 --> 00:00:20,810
FLUIDS IN SPACE WITHOUT ANY
MOVING PARTS, WITHOUT ANY

10
00:00:20,810 --> 00:00:22,820
ELECTRICITY, JUST FLUIDICS.

11
00:00:37,540 --> 00:00:41,560
NOW WE CAN APPLY RESEARCH
RESULTS THAT WE'VE LEARNED

12

00:00:41,560 --> 00:00:44,590
FROM DOING EXPERIMENTS IN
SPACE TO ACTUAL SPACE SYSTEMS

13
00:00:44,590 --> 00:00:47,739
THAT ACTUALLY REQUIRE GRAVITY
TO BE GONE FOR THEM TO WORK.

14
00:00:48,490 --> 00:00:49,690
THAT'S DIFFERENT.

15
00:00:49,720 --> 00:00:51,370
THAT'S A NEW
HORIZON, I WOULD SAY.

16
00:00:53,830 --> 00:00:55,630
OKAY, MARK READY
ON STEP FOUR.

17
00:00:56,370 --> 00:00:59,490
THIS IS AN ENGINEERING
DEMONSTRATION OF A WASTEWATER

18
00:00:59,490 --> 00:01:00,720
PURIFICATION SYSTEM.

19
00:01:01,500 --> 00:01:05,430
SO INSIDE THAT FOAM ARE
ALL THESE WEIRD CHANNELS AND

20
00:01:05,430 --> 00:01:07,080
DIFFERENT WETTING
FOAMS IN THERE

21
00:01:07,585 --> 00:01:10,865
SUCH THAT CAPILLARY FORCES
WICK THE LIQUIDS OUT,

22
00:01:10,895 --> 00:01:11,975
OPENING THE CHANNELS UP.

23
00:01:12,035 --> 00:01:14,225
SO IT'S A CAPILLARY SOLUTION
TO AN ENGINEERING PROBLEM

24
00:01:14,554 --> 00:01:17,824
OF MANAGING BRINE AND
CONTAMINATED WATER STREAMS.

25
00:01:19,494 --> 00:01:21,865
THAT SOUNDS REALLY,
REALLY INTERESTING

26
00:01:21,865 --> 00:01:23,664
AND FRANKLY, REALLY COOL.

27
00:01:23,664 --> 00:01:24,925
I CAN'T WAIT TO SEE WHAT IT DOES.

28
00:01:25,885 --> 00:01:27,925
WHAT YOU'RE GOING TO DO IS
YOU'RE GOING TO OPEN THAT LITTLE

29
00:01:27,925 --> 00:01:31,495
VALVE OUT OF THE DRINK BAG, AND
YOU'RE GOING TO PRIME THE TUBE.

30
00:01:31,855 --> 00:01:34,884
THEN YOU'RE GOING TO SQUEEZE
THAT BAG, THE DRINK BAG,

31
00:01:35,185 --> 00:01:38,365
AND THEN KIND OF IN ABOUT 15
SECONDS FILL THE ENTIRE FOAM

32
00:01:38,515 --> 00:01:39,955
WITH THE CONTENTS OF THE BAG.

33
00:01:41,895 --> 00:01:44,745

THE INTERIOR PIECE OF THAT
FOAM IS HIGHLY WETTING.

34
00:01:44,895 --> 00:01:46,815
SO IT WANTS TO
SUCK UP THAT WATER.

35
00:01:47,085 --> 00:01:49,305
BUT THEN THERE
ARE PIECES ON THE OUTSIDE

36
00:01:49,305 --> 00:01:50,805
THAT ARE HYDROPHOBIC.

37
00:01:50,805 --> 00:01:51,005
SO

38
00:01:51,125 --> 00:01:53,375
IT DOESN'T WANT THE WATER
TO PENETRATE THROUGH.

39
00:01:53,375 --> 00:01:55,355
SO HOW CAN WE MIX THAT UP?

40
00:01:55,385 --> 00:01:56,135
WHAT ARE THE ISSUES?

41
00:01:56,135 --> 00:01:57,155
WHAT DOES THAT LOOK LIKE?

42
00:01:57,365 --> 00:02:00,425
BECAUSE ULTIMATELY THIS PIECE OF
TECHNOLOGY, EVEN THOUGH IT'S SO

43
00:02:00,425 --> 00:02:04,955
SIMPLE AS A PIECE OF FOAM, IT CAN
POTENTIALLY DO SO MANY THINGS.

44
00:02:05,005 --> 00:02:06,505

IF YOU WATCH THE VIDEOS,
YOU SEE IT, YOU'RE GOING

45
00:02:06,505 --> 00:02:07,164
TO THINK IT'S DULL.

46
00:02:07,164 --> 00:02:08,335
AND WHAT ARE THESE GOOFS DOING?

47
00:02:08,845 --> 00:02:11,095
YOU'RE GOING TO SAY THAT,
BUT BASICALLY WHAT IT IS

48
00:02:11,095 --> 00:02:12,265
IS IT'S A DYED LIQUID.

49
00:02:12,265 --> 00:02:14,545
IT'S ACTUALLY RED FRUIT
PUNCH THAT WE USE, WHICH

50
00:02:14,545 --> 00:02:15,865
IS A SIMULANT FOR URINE.

51
00:02:17,280 --> 00:02:18,570
YOU LIKE THE BACKLIGHT

52
00:02:18,570 --> 00:02:18,960
VIEW?

53
00:02:20,340 --> 00:02:20,610
YEAH.

54
00:02:20,610 --> 00:02:23,010
WE'RE GEEKING OUT OVER THAT
IT GIVES US THE COMPLETE

55
00:02:23,040 --> 00:02:23,280
VIEW OF

56
00:02:23,550 --> 00:02:23,790
THIS

57
00:02:23,790 --> 00:02:24,810
WHOLE THING. IT’S NICE.

58
00:02:25,920 --> 00:02:26,700
THAT'S PRETTY COOL.

59
00:02:31,160 --> 00:02:34,370
SO THE PURPOSE OF THIS EXPERIMENT
IS TO SEE HOW WELL DOES THE FOAM

60
00:02:34,370 --> 00:02:36,200
HOLD THE LIQUID IN MICROGRAVITY.

61
00:02:36,410 --> 00:02:42,020
AND IF WE COMPLETELY AGITATE
IT AND REALLY PUT THIS PIECE

62
00:02:42,020 --> 00:02:43,940
OF EQUIPMENT THROUGH THE
RINGER, HOW WELL DOES IT

63
00:02:44,775 --> 00:02:45,555
BOUNCE BACK.

64
00:02:46,725 --> 00:02:48,945
HONESTLY, THE MOST SURPRISING
THING THAT'S COME OUT OF

65
00:02:48,945 --> 00:02:52,755
IT IS HOW SIMPLE WE CAN
MAKE THIS TECHNOLOGY.

66
00:02:53,325 --> 00:02:59,225
MAYBE THE FOAM PROJECT IS
GOING TO ENABLE A BACKUP SYSTEM

67
00:02:59,225 --> 00:03:02,375
FOR THE TOILETS, OR MAYBE IT'S
GOING TO BE A NEW WASTEWATER

68
00:03:02,375 --> 00:03:03,905
PROCESSING SYSTEM ALTOGETHER.

69
00:03:03,905 --> 00:03:04,385
AND THAT'S JUST

70
00:03:04,470 --> 00:03:05,130
THE FUTURE.

71
00:03:05,430 --> 00:03:09,690
IT'S JUST, I MEAN, IT FEELS LIKE
ANYTHING IS REALLY POSSIBLE.

72
00:03:10,340 --> 00:03:14,000
WE ARE VERY HOPEFUL THAT OUR
WORK, WHICH STARTED OUT IN

73
00:03:14,000 --> 00:03:17,480
FUNDAMENTAL RESEARCH AND HAS
TURNED MORE AND MORE APPLIED,

74
00:03:17,480 --> 00:03:19,700
CAN ACTUALLY GET TO THE
POINT WHERE IT'S DELIVERING

75
00:03:19,700 --> 00:03:24,050
ON EQUIPMENT, EQUIPMENT THAT
FUNCTIONS WITHOUT MOVING PARTS

76
00:03:24,320 --> 00:03:28,100
OR A MINIMUM OF MOVING PARTS
WITHOUT POWER, WITHOUT NOISE.

77
00:03:28,275 --> 00:03:32,235
YOU'D LOVE IT TO HAVE A SYSTEM

THAT JUST WORKS PASSIVELY BY

78
00:03:32,235 --> 00:03:35,985
ITS SHAPE AND WHETHER IT'S ON
THE MOON OR IN ORBIT AROUND

79
00:03:35,985 --> 00:03:38,625
THE MOON OR ON WAY TO MARS,
WE'D LOVE TO CONTRIBUTE IN THAT

80
00:03:38,625 --> 00:03:41,745
WAY AND IN THE WAY THAT MAKES
OTHERS ABLE TO DO THAT TOO.

81
00:03:42,135 --> 00:03:45,975
SO BY PUBLISHING THE DESIGN
LAWS, BY THE DESIGN EXPERIENCE,

82
00:03:45,985 --> 00:03:48,045
BY THE EXPERIMENT EXPERIENCE,
WE'D LOVE TO DO THAT TOO.