



1
00:00:01,366 --> 00:00:03,306

Good morning and welcome
to Mission Control Houston.

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00:00:03,306 --> 00:00:06,286

We're inside the International
Space Station Flight Control Room.

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00:00:06,826 --> 00:00:09,016

This team is following along with the activities

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00:00:09,016 --> 00:00:12,846

of the Expedition 29 crew
members onboard the space station.

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00:00:13,896 --> 00:00:16,256

The crew members are working
through the early afternoon

6
00:00:16,356 --> 00:00:20,966

of their day onboard the station working
on various science experiments today.

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00:00:21,586 --> 00:00:26,166

The crew includes station commander
Mike Fossum, cosmonaut Sergei Volkov

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00:00:26,536 --> 00:00:30,716

and Japan Aerospace Exploration
Agency astronaut Satoshi Furukawa.

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00:00:31,536 --> 00:00:34,456

Some of the experiments they've
been working on include one

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00:00:34,456 --> 00:00:39,816

that is studying the maximum oxygen uptake
for crew members onboard the space station.

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00:00:39,816 --> 00:00:42,376

It's called V02MAX for short.

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00:00:42,376 --> 00:00:45,946

It's also sometimes referred to as V02Peak.

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00:00:45,946 --> 00:00:50,956

It is the standard measure of aerobic capacity and is directly related

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00:00:50,956 --> 00:00:53,316

to the physical working capacity of an individual.

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00:00:54,126 --> 00:00:57,656

Station Commander Mike Fossum participated in that earlier this morning.

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00:00:58,026 --> 00:01:02,186

He and Flight Engineer Satoshi Furukawa also participated

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00:01:02,186 --> 00:01:07,986

in an educational payload called Education Payload Operations Demonstrations,

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00:01:07,986 --> 00:01:12,976

where they occasionally record video with educational content about life

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00:01:12,976 --> 00:01:14,796

and working onboard the space station.

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00:01:15,236 --> 00:01:19,846

Today's recording was about how the astronauts sleep onboard the station.

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00:01:20,586 --> 00:01:24,216

Those demonstrations have been a successful education program

22
00:01:24,216 --> 00:01:31,206
for the space station allowing NASA to
produce the physical properties such as force,

23
00:01:31,206 --> 00:01:33,836
motion and energy in a microgravity environment.

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00:01:34,636 --> 00:01:39,606
Those are different than what is
observed on Earth where gravity exists

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00:01:39,726 --> 00:01:43,906
and those video demonstrations
are being made available online

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00:01:43,906 --> 00:01:47,536
through the NASA Education
Project and Central Operations

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00:01:47,536 --> 00:01:51,986
of Resources for Educators, or core.nasa.gov.

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00:01:51,986 --> 00:01:54,406
That's core.nasa.gov.

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00:01:55,826 --> 00:01:59,426
Some of the other work involving
experiments is what we see here

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00:01:59,426 --> 00:02:05,806
with Mike Fossum inside the station working
to open the Combustion Integrated Rack to swap

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00:02:05,806 --> 00:02:10,546
out a component in that for the
continued research inside that rack.

32
00:02:11,036 --> 00:02:14,226

It is used to perform combustion experiments in microgravity.

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00:02:15,066 --> 00:02:20,606
The one that has been operating in it is called FLEX, the Flame Extinguishment Experiment,

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00:02:20,726 --> 00:02:27,366
which uses small droplets of fuel to study the special burning characteristics of fire in space

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00:02:28,036 --> 00:02:34,106
to help with fire extinguishment technologies in the future.

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00:02:35,616 --> 00:02:40,796
Another experiment being conducted onboard the station is by Flight Engineer Sergei Volkov

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00:02:40,936 --> 00:02:44,626
in the Russian segment called Coulomb Crystal,

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00:02:45,276 --> 00:02:49,956
a dynamic and structural characteristics experiment with the Coulomb systems.

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00:02:50,966 --> 00:02:53,906
Coulomb systems are structures following Coulomb's Law.

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00:02:54,086 --> 00:02:58,336
It's a law of physics describing the electrostatic interaction

41
00:02:58,336 --> 00:03:02,436
between electrically charged particles which was involved in the development

42
00:03:02,436 --> 00:03:04,466
of the theory of electromagnetism.

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00:03:05,716 --> 00:03:09,646

The crew members also worked together inside the Russian segment.

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00:03:09,736 --> 00:03:16,346

Volkov and Furukawa did a test of being able to send high quality video, or MPEG-2 files,

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00:03:16,466 --> 00:03:21,956

from the Russian segment of the station using the network

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00:03:21,956 --> 00:03:24,216

of laptop computers onboard the complex.

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00:03:24,756 --> 00:03:28,046

An experiment running without interaction

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00:03:28,046 --> 00:03:32,586

from the crew members right now is the Capillary Channel Flow experiment.

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00:03:33,726 --> 00:03:38,106

That only needs interaction by the crew members to change

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00:03:38,106 --> 00:03:40,586

out components every once in awhile, or samples.

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00:03:41,116 --> 00:03:45,486

That runs autonomously and is monitored by the team of scientists

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00:03:45,486 --> 00:03:46,806

and engineers here on the ground.

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00:03:47,476 --> 00:03:55,136

That experiment is studying how capillary flow

is different in space and hopefully to use

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00:03:55,136 --> 00:03:58,926

that information to enable
the design of spacecraft tanks

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00:03:58,926 --> 00:04:02,536

that can supply gas free
propellant to spacecraft thrusters.

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00:04:03,436 --> 00:04:07,136

Greatly cutting costs and weight
while improving reliability.

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00:04:07,566 --> 00:04:12,326

Currently spacecraft fuel tanks rely on an
additional reservoir to prevent the ingestion

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00:04:12,326 --> 00:04:14,526

of gas into the engines during firing.

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00:04:14,826 --> 00:04:22,576

The experiment is testing the theoretical
predictions for the free surface shapes

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00:04:22,676 --> 00:04:26,966

and critical flow velocities for open
capillary channel flows in microgravity.

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00:04:27,926 --> 00:04:31,526

This is video being sent down from
the International Space Station

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00:04:31,526 --> 00:04:34,626

of that Capillary Channel Flow experiment.

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00:04:35,266 --> 00:04:39,446

It is streamed real-time to scientists
here on the ground to monitor.

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00:04:40,676 --> 00:04:43,856

The experiment is designed to validate the assumptions used

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00:04:43,856 --> 00:04:47,376

to develop the governing equations of capillary flow.

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00:04:48,196 --> 00:04:52,016

The experiments provide the verifications for the flow rate limits

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00:04:52,016 --> 00:04:54,306

and corresponding critical flow velocities.

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00:04:54,826 --> 00:04:59,886

By understanding capillary fluid flow rates in microgravity hardware can be developed