**Our thoughts on the “Beresheet” crash**

According to Wikipedia : "…it appeared that due to failure of one of the spacecraft's accelerometers, a chain of events resulted in the engine being shut down and failure to land."

According to Jerusalem post : "A command intended to correct a malfunction in one of the Beresheet spacecraft’s inertial measurement unit led to a chain of events that turned off its main engine during landing, ..."

According to Globes : "…showed a malfunction in the spaceship's acceleration measurement components, leading to a series of malfunctions that caused the engine to shut down.”

Naturally there is a lot of information that is not available to us , but we made some assumptions.

**Investigation of the crash according to the YouTube video "משדר מיוחד-ניסיון הנחיתה של החללית בראשית על הירח":**

At 1:43:10 – the IMU2 is not working

At 1:43:26 - The numbers in telemetry (simulation) got stuck with a horizontal speed of 901.7, a vertical speed of 24.8, and a fuel of 118.06 kg.

At 1:43:43 - Communication with MPL is lost, no telemetry.

At 1:44:32 - telemetry is back to work, horizontal speed 880.2 and continues to rise, vertical speed 47.9 and continues to rise, fuel 105.06 kg, 10 km from the ground.

At 1:45:02 - vertical speed in red with 71.0 and continues to rise, fuel 99.06.

At 1:45:37 - It is said "Look at the accelerations, main engine is off".

At 1:46:24 - It is said "we are without a main engine, no braking for the system".

At 1:46:48 - vertical speed 131.1, horizontal speed 948.0, fuel 77.06 kg and main engine returned to work, 150 meters from the ground.

At 1:47:25 - It is said "We lost communication".

At 1:48:13 - It is said " The data is incorrect". With vertical speed 134.3 and stopped, horizontal speed 946.7 and stopped and fuel 77.06 and stopped.

At 1:49:00 - they concluded that the spacecraft crashed on the moon.

**What can be understood from the investigation:**

As we know, the moon has a force of gravity, relatively smaller than that of the earth. SpaceIL assumed the spacecraft would land with less fuel than what happened (about 25kg of difference).

Therefore, we believe that once the spacecraft lost IMU2, it began to spin (because the control was lost). A situation was created that the fuel did not reach the engine, so the spacecraft crashed with more fuel than expected.

Another product of this spacecraft imbalance was that the horizontal speed increased from 901 to 948 in a few seconds.

Horizontal and vertical velocities continued to increase due to Moon's gravity and imbalance prevented the spacecraft's containment.

One thing is perfectly clear, from the time the system was reset to the time the system re-emerged, the ship lost much altitude that was not able to control its landing as planned. In addition, the main computer failed to work according to the designed landing algorithm and it signed the project.

**Authors:** Snir Shaharabani and Lioz Elmalem.