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# ASTRO

## The Partner School Science Program Newsletter

### NASA New Year's Mission: Repair Cracks on Discovery Fuel Tank



Newly discovered cracks in the space shuttle Discovery's external fuel tank have kept repair crews busy into the New Year as NASA eyes a Feb. 3 launch for the orbiter and its six-member crew.

The small cracks, uncovered Thursday as technicians used X-ray devices to inspect the external tank, represent the latest bump along the road to launch. The cracks were found following a chain of inspections, repairs, and more inspections dating back to Discovery's scrubbed Nov. 5 liftoff.

That liftoff was canceled after unacceptably high levels of explosive hydrogen were detected outside a crucial fixture on the side of the tank. When technicians returned to the launching pad after the liquid hydrogen and liquid oxygen tanks had been emptied, they noticed cracks in the external tank's foam insulation at one of 108 "stringers" - long U-shaped aluminum ribs that reinforce a section of the tank's outer shell. This section, toward the top of the tank, spans a gap between the hydrogen and oxygen tanks inside.

Once technicians removed the cracked segment foam in anticipation of repairing it, they found that the stringer beneath the foam had cracked, too - shifting enough to fracture the foam. Subsequent inspections showed that a second, adjacent stringer hosted a small crack as well.

Although these cracks have appeared in past tanks and were successfully repaired, this incident was unusual because in the past, the cracks were caught far earlier in the shuttle program's inspection process, mission managers say.

## Martian Moon Mystery

The Martian moon Phobos is cratered, lumpy and about 16.8 miles long, or 3 miles longer than the island of Manhattan. According to a recent study, the moon is also



unusually light. Planetary scientists found that Phobos is probably not a solid object, and that as much as 30 percent of the moon's interior may be empty space.

That doesn't mean that Phobos is an empty shell where we could, say, set up a rest stop for spaceships on their way to the outer planets. But the new finding probably does mean that Phobos was not an asteroid that got caught in Mars' gravity as it floated by the planet.

Phobos is the larger of Mars' two moons, and astronomers have had many ideas about

where it came from. Previous studies have suggested that Phobos was an asteroid. Other studies suggest the moon formed from bits of Martian rock that were sent into space after a giant object, like an asteroid, crashed in Mars. The new study suggests that neither of these ideas is completely correct. The truth might be some combination of the two.

Scientists may never know how Phobos came to be a Martian satellite, but the new study may help eliminate some possibilities, says planetary geophysicist Tom Andert.

Andert and his colleagues were able to study Phobos thanks to the [Mars Express](#), a spacecraft that orbits Mars and takes measurements. That spacecraft left Earth in 2003 and is a project by the European Space Agency, or ESA. In March, *Mars Express* flew closer to Phobos than any spacecraft ever had before, ESA reports.

They found that Phobos has a density of about 1.87 grams per cubic centimeter. The rocks in the crust of Mars, for comparison, are much denser: about 3 grams per cubic centimeter. This difference suggests that Phobos is not made of rocks from the surface of Mars.

Some asteroids have densities of about 1.87 grams per cubic centimeter, but Andert says that those asteroids would be broken apart by Mars' gravity — a fact that probably rules out the possibility that Phobos was once a free-floating asteroid.

## **IMAGE OF THE DAY - Where Stars Are Born**

This mosaic image is the sharpest wide-angle view ever obtained of the starburst galaxy, Messier 82 (M82). The galaxy is remarkable for its bright blue disk, webs of shredded clouds and fiery-looking plumes of glowing hydrogen blasting out of its central regions.



*Image Credit: NASA, ESA, and The Hubble Heritage Team*

Throughout the galaxy's center, young stars are being born 10 times faster than they are inside our entire Milky Way Galaxy, which results in a huge concentration of young stars carved into the gas and dust at the galaxy's center.

The fierce galactic superwind generated from these stars compresses enough gas to make millions of more stars.

In M82, young stars are crammed into tiny but massive star clusters. These, in turn, congregate by the dozens to make the bright patches, or starburst clumps, in the central parts of M82. The clusters in the clumps can only be distinguished in the sharp Hubble images. Most of the pale, white objects sprinkled around the body of M82 that look like fuzzy stars are actually individual star clusters about 20 light-years across and contain up to a million stars. The rapid rate of star formation in this galaxy eventually will be self-limiting. When star formation becomes too vigorous, it will consume or destroy the material needed to make more stars. The starburst then will subside, probably in a few tens of millions of years.

*Note: Image of The Day section's aim is to create curiosity in your mind and make you want to search about the image or topic, rather than us giving full details about the image. We are expecting you to ask yourself questions and to search for information about the image of the day to get answers and learn more.*