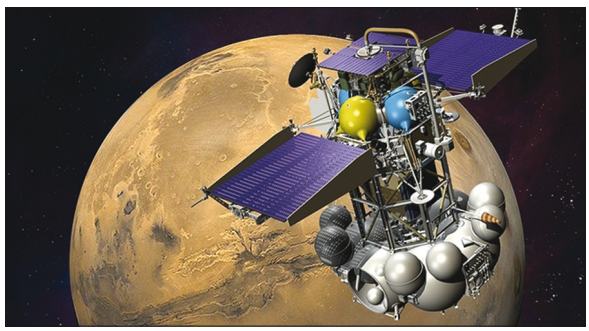
News & Analysis

Russia fears fiery end for Mars craft

Russia's first interplanetary mission in more than 15 years failed after launch last month because of an engine mishap that prevented the unmanned spacecraft from being sent on its proper course toward Mars. The craft – known as Phobos-Grunt – is now trapped in orbit around Earth and, as *Physics World* went to press, hopes were fading that Russian technicians would be able to fire its engines. Phobos-Grunt is currently about 200 km above the Earth in a rapidly decaying orbit – and could plummet to the ground before the New Year.

Phobos-Grunt, costing $163m, is a Russian Space Agency (Roscosmos) mission that was designed to travel to Mars' moon Phobos and return up to 200 g of its soil to Earth in a three-year trip ending in 2014. The craft is also carrying Yinghuo-1 – a Chinese probe that is supposed to separate from Phobos-Grunt to orbit Mars for one year to study the planet's atmosphere. The 115 kg probe would be the first by China to venture to another planet.

Phobos-Grunt (which means Phobos-soil) was launched on 8 November from the Baikonur launch pad in Kazakhstan on a Zenit-2SB rocket. The craft initially took off successfully and separated from its Zenit launch vehicle, but its own propulsion system then failed and the craft began to veer off course.



Roscosmos

Fading dreams
Russia's Phobos-Grunt craft, which would have returned a sample of soil to Earth from Mars' moon Phobos, failed to fire its engines to get out of Earth orbit shortly after take-off last month.

NASA satellite expert Nicholas Johnson of the Johnson Space Center in Texas told *Physics World* that the spacecraft is "anticipated to fall back to Earth in late December", with the exact time depending on "both the level of solar activity and the attitude/stability of the spacecraft". He adds that NASA would be able to give only a two-hour warning prior to re-entry with an uncertainty of about 25 minutes either way, thus making it difficult to predict exactly where any debris would land.

Indeed, it is uncertain whether the spacecraft will break up completely during re-entry, or if larger pieces will fall to Earth. "We cannot predict what components might survive re-entry since we do not have sufficient engineering details on Phobos-Grunt," says Johnson, alluding to a lack of information emerging from Roscosmos about the mission.

In particular, there is some concern about the fate of several tonnes of fuel aboard Phobos-Grunt. Johnson says that the fuel could reach Earth intact if it is encased in tanks made of a material, such as titanium, with a high melting temperature. However, if the tanks are made from aluminium, as RIA Novosti, the Russian news agency, suggests, they would melt during re-entry, dispersing the fuel.

Hamish Johnston and Michael Banks

Russia

Red tape and cuts bring researchers to Moscow streets

More than 500 researchers in Russia have come out in protest over the country's lack of research funding and its excessive bureaucracy that they say are destroying science in the country and forcing the nation's researchers to go abroad. The protests, which were organized by bodies including the Professional Union of the Russian Academy of Science and the Russian Union of Students, took place in Pushkin Square in Moscow on 13 October to demand that the government make urgent changes to how science is funded.

The protestors, including students as well as academics, called on the government to almost double the funding allocated to the country's two main research councils – the Russian Foundation for Basic Research and the Russian Foundation for Humanities – from 7 billion rubles (£144m) in the draft 2012 budget to 12 billion rubles (£247m). This rise would bring spending back up to 2009 levels, adjusted for inflation. They also want the government to reduce the level of red tape by relaxing the need for competitive procurement processes and cutting the amount of paperwork that researchers have to submit to claim funding.

"The government's commitment to cutting grant funding for science has remained unchanged, while the current law on public procurement still does not allow scientific teams to use even these small funds efficiently," says Viktor Kalinushkin, chair of the Professional Union of the Russian Academy of Science, who helped to organize the protest. "That is why the union believes that the only way to reach a solution to the pressing problems of competitive research funding is to conduct mass protests."

The protesters claim that solving these issues is vital if Russia is to retain its brightest minds. "If our demands are ignored, the number of Russian researchers leaving to work abroad will grow sharply and it is the young scientists who will leave first," Sergey Dmitriev, a researcher at the Belozersky Institute of Physical and Chemical Biology in Moscow, told *Physics World*. "We do not want to spend our lives shuffling paper, we want to do research."

> We do not want to spend our lives shuffling paper, we want to do research

Last year the Russian government proposed some changes to procurement rules and also announced the ambitious Innovative Russia 2020 scheme, under which it plans to increase research spending to 1.1 trillion rubles (£22.6bn) over the next decade. The protesters, however, remain unconvinced. "The government must show its commitment to science in our country through its actions, not just in its words," says Dmitriev.

Simon Perks