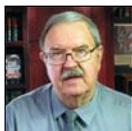


on Russian space

Stuck in decline

by James Oberg

jamesoberg@comcast.net



Modern spaceflight, former NASA Administrator Mike Griffin was fond of saying, is so complex that it can be pulled off only when people are performing at their absolute best. But judging by their string of spaceflight failures in recent years, the people inside Russia's space industry no longer seem to be at their peak.

The latest mishaps — booster failures, payload failures, control center-command errors and a nagging issue with solar panel deployment on two of the last four Soyuz missions — have reignited concern among Russians over unsolved, perhaps unsolvable, quality control deficiencies within the country's space program. Attempts to reverse the long post-USSR spaceflight retreat have borne little visible success. If anything, a host of new challenges, foremost among them lack of money, have exacerbated the problems.

Because many aspects of Russia's domestic space program are tightly integrated into international projects such as the space station, those concerns affect other national space programs as well.

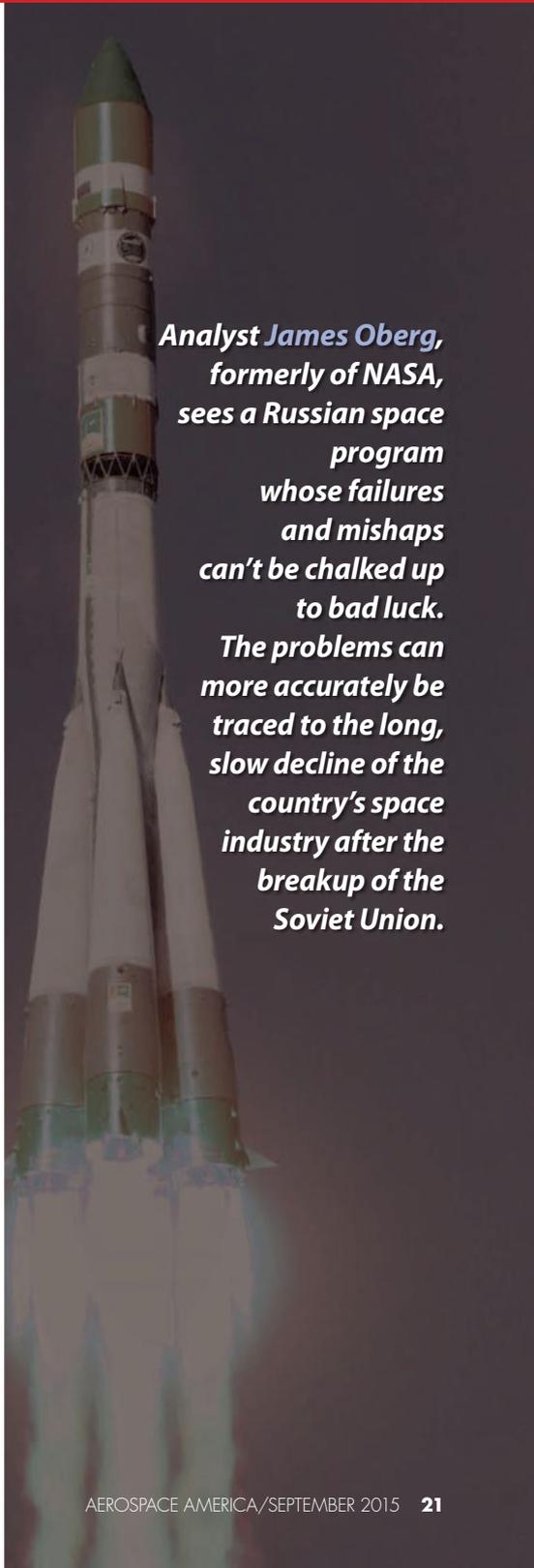
Recently, Russian Deputy Prime Minister Dmitry Rogozin, Moscow's point man for the space industry, lamented what he called corrupt management and other systemic ills within Russia.

"With such degradation in the leadership, one should not be surprised at the high accident rate," Rogozin told Russian lawmakers in a speech in May, according to news reports. Days later, a Russian watchdog agency alleged that the nation's space programs had misspent \$1.8 billion in 2014 alone.

Reforms initiated by Rogozin likely won't bear fruit for several years — assuming he gets enough money to implement them. Igor Komarov, a former auto industry executive and the fourth person in six years appointed to fix the Russian space agency Roscosmos, said a turnaround "will need profound reforms."

The Russian space industry retains a core competency that continues to operate mature space systems, perform regular upgrades, and occasionally pull off respectful leaps in capability such as the new Angara booster family, or not long ago, a 500-day ground isolation test run for a manned Mars mission. But the problem that Komarov and others have been addressing is much deeper than the highly-visible rocket explosions, spaceflight operator errors and corruption trials.

Continued on page 23



Analyst James Oberg, formerly of NASA, sees a Russian space program whose failures and mishaps can't be chalked up to bad luck. The problems can more accurately be traced to the long, slow decline of the country's space industry after the breakup of the Soviet Union.

Decline

Continued from page 21

The scope of the problem goes far beyond the evident troubles; it also shows in the things we don't see.

Russia has not ventured beyond Earth orbit in a quarter century. And the list of promised deep-space missions invariably seems to retreat further and further into the future.

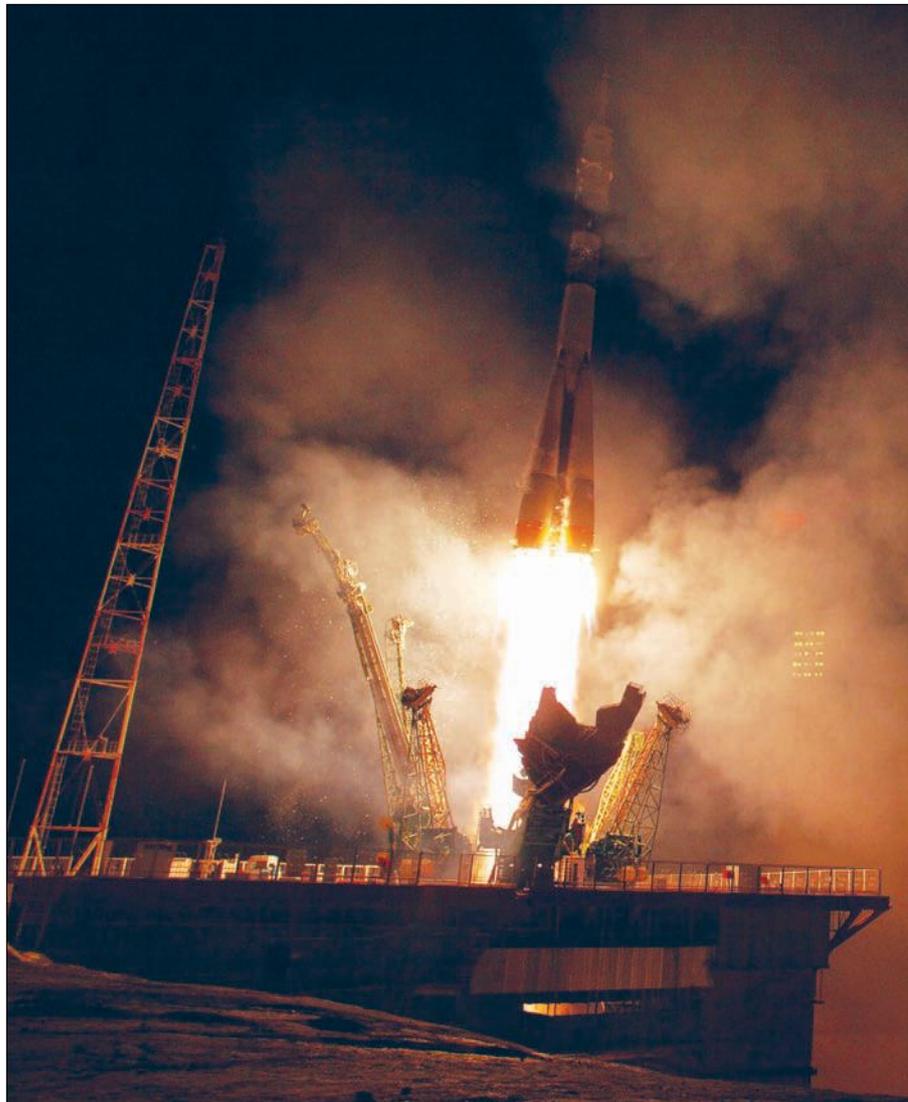
Russia also has been unable to replace the Soviet-era full-orbit coverage communications relay satellite network — code named Luch, the equivalent of NASA's Tracking and Data Relay Satellites. This is curtailing human spaceflight operations and forcing Russia to rely on NASA's communications network.

More embarrassing is Russia's inability to produce and deliver the long-promised and years-delayed Nauka Science Module, which was supposed to host a major upgrade of Russian station-research capabilities. It's uncertain whether Nauka will ever be built, making Moscow's boasts about building its own orbital outpost ring hollow.

The litany goes on. GLONASS, Russia's answer to the American GPS network, is mired in production shortages for handsets. Fabrication of next-generation spacecraft has been seriously hampered by lack of access to Western electronic components put under embargo after President Vladimir Putin's annexation of Crimea. Thanks to breakdowns of old satellites and delays of promised replacements, Russians still must buy much of their weather and Earth imagery from abroad. The new weather-forecasting satellite is officially still undergoing acceptance testing two years after launch. Even a key rocket fuel, heptyl, is now imported from Germany.

Perhaps most dangerously in an era of growing world tensions, Russia's military officials are publicly complaining that the missile early-warning satellite network has totally collapsed. The delay of replacement satellites means Moscow must rely on ground radars to detect any missile attack, slowing detection and giving dangerously brief window to make life-or-death decisions.

All this may seem like piling on, and no major program is immune to sporadic failures. But the sheer number of technical, operational and financial woes bedeviling



Soyuz TMA-14M lifts off toward the space station in 2013 carrying a crew of three. Two of the last four Soyuz missions have been bedeviled by trouble with solar panel deployment.

Russia's once-vaunted space program is worrisome. The recent failure of a crewed Soyuz to deploy a solar array, the second in the last four flights — after 30 years of faultless performance — is a disturbing reminder of the “canary in the coal mine” metaphor, a sign of more widespread danger.

Many of the root causes, including an aging workforce, low salaries, obsolescent infrastructure and the deterioration of a culture of disciplined quality control, remain largely unresolved. Meanwhile, a spate of new problems adds to the strain on Russia's space program.

The economic embargo and boycotts following Russia's claim over the Crimean peninsula has exacerbated Russia's vulnerability stemming from its reliance on foreign avionics components. This has added to the

Continued on page 25

Decline

Continued from page 23

previously recognized need to develop domestic suppliers for several hundred critical aerospace products previously purchased from Ukrainian factories.

The plunge in world oil prices has slashed Russia's space budget by as much as one third less than promised. What's more, Russian policymakers have been siphoning rubles from the space program to military investments. Still more money is being diverted to dubious infrastructure projects, such as the Vostochny Cosmodrome in Siberia and refitting confiscated Ukrainian-owned space facilities in the Crimea. Even if properly managed — and it clearly has not been — this enormous construction boondoggle is sucking up a large share of the financial resources.

The entire space industry is undergoing a massive reorganization with the stated goal of eliminating redundant industrial ca-

pability and standardizing quality control processes. While touting the need to hire 10,000 college graduates per year, Rogozin has declared that 100,000 of the 250,000 current workers will lose their jobs as underused and duplicate production capacity is eliminated. The trick then is to retain enough skilled veterans who can work alongside new hires and pass on the hard-earned wisdom of their experience.

A perennial problem in Russia, graft and corruption, has resulted in more than a hundred prosecutions of middle- and upper-level officials, including Vitaly Lopota, former head of the Energiya Rocket and Space Corp., and Vladimir Nesterov, former chief of the Khrunichev State Research and Production Space Center, the two biggest enterprises in the Russian space industry. Leaders in the west should feel a chill from Putin's recent call for a return to "1930's discipline" and media nostalgia for finding "a



Russia's Deputy Prime Minister Dmitry Rogozin, Moscow's point man for the space industry, reportedly warned that corruption and mismanagement is reflected in the high rates of accidents.

Russian Presidential Press and Information Office

Continued on page 27



Rescosmos

The mammoth Vostochny Cosmodrome under construction in Siberia could recharge Russia's space aspirations — or prove to be a costly boondoggle.

new Beriya,” brutal leader of Stalin’s post-World War II Soviet nuclear program.

Top-level plans seem to focus on a relentless crash effort to make a satellite launch out of Vostochny Cosmodrome by the end of this year. However, it’s worth noting that the same construction group that rushed the Sochi Olympics to last-minute completion is in charge. But getting the launch off will not signify the achievement of operational capacity. That’s because the fixes largely come at the expense of existing resources. These schedule-driven directives have called for use of emergency utilities, the shortcutting of other infrastructure by leaving out all facilities not directly supporting the initial launch, and the temporary duty of key personnel from experienced launch teams from other launch sites. None of these ad hoc measures will ameliorate the growing weaknesses that have already been inducing an intolerably high error rate in the mainstream Russian space industry, nor will a successful but purely symbolic “on time” first launch.

That NASA officials have been downplaying Russia’s problems reflects respect for Russia’s space heritage. It also indicates a blind faith in the constancy of the odds governing catastrophic failures, which for Russia have historically been low. That faith results from a logical fallacy, and not merely because dice have no memory. In the space business, engineers like to rely on as many of the same fabrication tools, human skills and techniques as possible from mission to mission, but some change is inevitable no matter how hard they try. This means that every mission is carried with a new set of dice — and a growing number of external factors are loading each new set of dice more and more against Russian success.



James Oberg is a former NASA Space Shuttle mission control specialist who led the orbit design team for the first International Space Station assembly mission in 1998. He is author of a dozen books on space exploration and is a former space consultant for NBC News.

Decline
Continued from page 25

New Releases in AIAA's Progress in Astronautics and Aeronautics



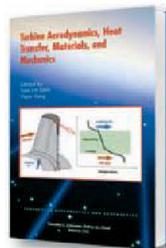
Turbine Aerodynamics, Heat Transfer, Materials, and Mechanics

Tom I-P. Shih and Vigor Yang

AIAA MEMBER PRICE: \$89.95

LIST PRICE: \$129.95

ISBN: 978-1-62410-263-9



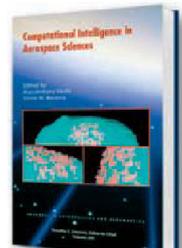
Computational Intelligence in Aerospace Sciences

Massimiliano Vasile and Victor M. Becerra

AIAA MEMBER PRICE: \$94.95

LIST PRICE: \$134.95

ISBN: 978-1-62410-260-8



**Don't Miss These and Many More
Exciting Titles from AIAA's Progress in
Astronautics and Aeronautics Series**

arc.aiaa.org

