Russian, Ukrainian Space Industries Look for their Place in a Changing Commercial Market

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Russia's commercial space sector has come a Long way from its somewhat awkward birth in the 1980s. And while the industry is much more sophisticated than ever, it faces a complicated future due to today's difficult market conditions rather than the political issues that prevailed during the past decade.

One of the Russian space program's major goals, as repeatedly voiced by Russian Aviation and Space Agency head Yuri Koptev, is to achieve commercial revenue from space launch services of $1 billion annually — a figure comparable to one quarter of the country's international arms sales (about $4.2 billion in 2001).

Russia neared this mark in 2000 when a volume of $880 million was recorded. It was followed by the $300 million in revenue togged during 2001 — a drop-off that was due to the dramatic shrinking of the world's commercial launch services marketplace. While Russia faces the

Launch complex at ocean locations near the equator. Due to the ability to move the launch pad to positions in the equator's vicinity, Sea Launch is able to provide slightly more mass-effective services — allowing larger satellites to the carried to orbit. Since 1999, seven commercial Launches were performed (with one launch failure in 2000). Like ILS, Sea Launch includes former-USSR manufacturing companies (Yuzhnoe of Ukraine and Energia) and a U.S. marketing partner — Boeing.

The third competitor is the Russia-French Starsem company, which proposes the smaller Soyuz launchers manufactured by TsSKB-Progress of Samara and operated from Baikonur Cosmodrome in Kazakhstan. Ten launches were performed by Starsem in 1999-2000, placing Globalstar constellation spacecraft in orbit, as well as carrying European Space Agency's (ESA) Cluster scientific constellation and the IRDT landing system demonstrator. Since then, the disappearance of many planned satellite constellations for telecommunications systems has eliminated numerous hoped-for payloads on Soyuz, although ESA still has an upcoming Mars mission booked on this reliable launcher. Further complicating the situation was the May 2002 partial collapse of Building 112 at Baikonur, where the Starsem clean room satellite processing facility and office complex is located.

Former USSR GEO-capable launch vehicles commercial launches' dynamics

	1996	1997	1998	1999	2000	2001	2002	
Proton	2	6	4	5	6	2	3	1 failure in 1997
Zenit SL	0	0	0	1	3	2	1	1 failure in 2000

Russian and Ukrainian launch service providers are struggling to cope with the same market difficulties their competitors are facing in Europe, the U.S., China, Japan and India: a decline in demand for telecommunications services, the development of larger satellites with longer service lifetimes, and an increasing number of commercial launch vehicles vying for a shrinking business base.

According to Space Systems/Loral, the increase of transponders carried by a typical spacecraft (from 48 for average Western satellite of late 1990s to 96 on new-generation spacecraft) decreases the per-transponder cost by a factor of 1.4 — from $4.3 million to $3 million. As a result, many telecom operators are moving to bigger satellites that can carry increasingly large transponder payloads, taking them beyond the lift capability of Proton and Zenith.

Many launchers have entered the marketplace during the past several years in anticipation of an upswing in demand for commercial services. The result today is an overcapacity that threatens to force one or more of the competitors out of the race. The average annual commercial launch rate worldwide is about 30+ commercial geostationary orbit satellites, while the combined capability of the world's leading manufacturers is about 55 satellites annually.

Among the newest competitors in the already tight market are America's Atlas-V (Lockheed Martin) and Delta-IV (Boeing), as well as Europe's Ariane 5 (operated by Arianespace). The stagnation in the Proton and Zenith commercial launch rate because of the difficult market conditions is clearly visible in the table above.

Khrunichev analysts believe that the trend toward increasingly large satellites may not continue, opening new opportunities for vehicles in the Proton category. Pointing the termination of a number of heavy satellite manufacturing programs like


Sesat and its sister spacecraft based on Express-M platform are the most internationally sold Russian satellites

Astrolink or Spaceway, they insist that the niche for the mid-sized and smaller satellite launch services would continue for some years to come. Stressing the necessity to keep the market share of the launch service market Khrunichevis calling for the Russian government support to introduce the new generation Angara modular launchers that would compete with Atlas-V and Delta-IV beginning after the mid-decade.

To penetrate other market segments, Energia, Starsem and Yuzhnoe are promoting the location of commercial launch systems at launch sites near the equator. Energia is planning to implement the Christmas Island launch center project with Australia-based Asian-Pacific Space Center to operate Aurora — a highly modified version of Soyuz, with first launch planned for 2004. Starsem is at the center of a joint Russia-ESA project to launch Soyuz from the Spaceport facility in Kourou (where Ariane 4s and Ariane 5s currently are launched). And Yuzhnoe plans to launch Tsyklon-4s from Brazilian Alcantara test range.

In theory, the lighter-weight class Soyuz and Tsyklon could offer lower-cost solutions forsingle-payload launches with geostationary satellites as a result of their liftoff points near the equator.

In launch services to low Earth orbit, commercial launch projects include Khrunichev's Rockot and Cosmos from NPO Polyot of Omsk. In late September, the European Space Agency and Eurockot Launch Services GmbH announced signing the contract for CryoSat research satellite launch by Eurockot's Rockot launch vehicle. Khrunichev Center is to perform the launch from Plesetsk in June 2004. In 2003, Rockot is to deliver three satellites for Czech, Canadian and Japanese customers.

Last July, Surrey Satellite Technology Ltd. (SSTL) and Rosoboronexport arms trade company signed an agreement to launch SSTL satellites on Polyot-manufactured Cosmos launchers provided by Rosoboronexport. In the next two years, a trio of Cosmos launch vehicles will orbit eight Surrey microsatellites to form an international control system called the Disaster Monitoring Constellation (DMC).

The other light-class vehicles are represented by the Start launcher and a number of submarine-ICBM's derived vehicles offered by Makeyev Rocket and Space Center of Miass. However, no long-term plans were announced for commercial use of these rockets.

Satellite Market Is Attractive but Competitive

In contrast with the relatively broad Russian participation at the launch services' market, the country's companies' efforts to penetrate the commercial satellite market still are of very modest success.

So far, NPO PM of Zheleznogorsk has been most successful in selling the satellites to the foreign customers — thus competing with more advanced designs of the Western competitors. After successful deployment of Eutelsat-procured Sesat in 2000, the company is proposing similar satellites using Western-made communication payloads to customers both in Russia and abroad. The most remarkable contract under negotiation is Vinasat, Vietnam's first national fixed communication satellite that could be built under a $200 million project. In spite of the repeated reports about a contract signing, NPO PM is still finalizing the contract details with the state-run Vietnam Posts and Telecommunications Corp. (VNPT).

If the Russian firm is able to clinch the Vietnam deal, it will employ a satellite with 28 C/Ku transponders based on Express-M bus (earlier used for Sesat and for the Russian national Express-AM satellites) for deployment in geostationary orbit in 2004. Express-M-based satellites are 2,600 kg. platforms with 12-year design lifetimes, providing up to 4,200 Watts for the communication payload.

If equipped with a Western-built communications payload, the Express-M-type satellite could provide an interesting solution for a number of customers. However, the specific transponder in-orbit cost for satellite like Vinasat is about $7 million, which is significantly more than the announced reference figures for Russian Satellite Communication Company ($ 3.7 million), Intersputnik ($ 1.8 to 2.5 million) or figures for the typical Western large GEO comsats ($3 to 4.5 million by Space System/Loral's estimation of 2000).

Other "marketable" satellite project on the Russian market are Khrunichev's Yakhta light bus-based small communication satellite; the very similar Ruslans of NPO Mashinostroyeniya; and Energia/Gazkom's

Proton launcher is still most successful commercial project of the Russian space industry

Yamals — which are the only flight-proven of the three designs. Although both Khrunichev and NPO Mashinostroyeniya have signed contracts with Intersputnik, the market prospects of these spacecraft still require definition. Khrunichev is now stressing the offer of a complete satellite communication system (or at least the turn-key space segment), including the small satellites and corresponding ground control system. However, the company has yet to disclose any contracts or negotiations.

Man-related Systems: Is There Market at All?

In the beginning of the 2000s, Russian companies faced the necessity to commercialize the man-related space systems and infrastructure — that is to propose the goods and services based on the country's unique ability and experience in manned space flight. The two emerging markets in this connection are space tourism and production of the manned space modules for commercial customers.

The capability to provide the 'tour services', as well as 'turn-key' services of sending commercial passengers and researchers to the International Space Station (ISS) aboard Soyuz manned capsules is linked to Russia's status as 'full partner' in the ISS program. As a result, RSC Energia can propose using the third seat in three-place Soyuz capsules for commercial passengers on the twice-yearly "taxi" missions to the space station.

Not only can RSC Energia offer the empty seats for about $20 million on a ten-day space ride, the company can also insist on the right to do so even in spite of the NASA's rather chilly attitude to such commercial flights. After the pioneering flights of space tourists Dennis Tito and Mark Shuttleworth, space tourism seems to be developing into a real market, with a number of would-be customers lining up. However, the recent failure of American singing star Lance Bass to purchase a seat in this autumn's Soyuz taxi mission emphasizes the risky nature of the space tourism business. The complicated relations between Rosaviakosmos and Energia led to the company's declared inability to provide any more Soyuz and Progress vehicles after Bass' failure to pay the negotiated sum. It is not sure that a tourist opportunity may be available on the next taxi Soyuz, planned for April 2003.

This October, an agreement was signed between Rosaviakosmos and the country's prime national TV channel, ORT-First Channel, that calls for a one-week ISS visit in fall 2003 for the winner of the new reality show. ORT plans to send volunteers to the Star City to go through a cosmonaut training course, as well as "to demonstrate the country's space achievements". According to ORT statements, the company is planning the similar show programs yearly for some years to come. While the channel's management has talked about the agreed 2003 flight as "the first one", no long-term agreement for the Soyuz ride booking was revealed.

A far less ambitious enterprise is the Cosmopolis-XXI project, which is targeted at sub-orbital flights for cost as small as $100,000 per person. The C-21 winged prototype was demonstrated in mid-March 2002 by USA based Space Adventures, Ltd, Russian's Myasishchev Design Bureau and the Cosmopolis XXI Suborbital Corporation. The two-stage suborbital craft is comprised of a winged return vehicle and a carrier aircraft based on Myasischev M-55 Geophysika high altitude reconnaissance jet. However, this particular project would definitely call for quite a lot of venture capital to go further than the mock-up prototype shown public this March.

Khrunichev has joined with Energia in efforts to penetrate another aspect of the commercial manned space market. Their goal is to create an independent manned orbital space facility that would be developed using the companies' technology and experience gained by building Russia's long line of space stations, and supplying hardware for the ISS. The Khrunichev-built ISS Zarya module was the first effort in the field — which was supplied as part of Russia's participation in the International Space Station. Both firms currently are proposing new inhabited modules for ISS that would be built by the Russian space firms with a Western partner. For Khrunichev, the FGB-2-based 20-ton Commercial Space Module (CSM) is a promising project that could be developed jointly with Boeing — for which they hope to attract the necessary $50 million sum to finish the module's construction. The module would contain work areas that could be then rented to European and Japanese ISS partners that require additional room on the space station for their own research. In the late-2001, Khrunichev revealed that it was in talks with the European Astrium consortium on this issue, but the overall problems with the ISS project has slowed the process.

For RSC Energia, a "close relative" to the ISS' existing Mir-Shuttle Docking Module is being proposed by the company and U.S.-based Spacehab Inc. as the Enterprise commercial lab. The idea is to replace the originally planned Russian Docking and Stowage module with a 10-ton laboratory capable of housing 3-10 researchers working at on commercially paid programs.

As part of even more ambitious project, Energia proposed the Small Commercial Orbital Station (SGOS) or Mini Station 1 un der the Joint Resolution signed August 24, 2001 with Rosaviakosmos and MirCorp. The orbital facility would accommodate three visitors for stays of up to 20 days at a time. A Soyuz manned transport spacecraft on its way for a taxi flight to ISS would initially dock at the SGOS for two-week tourist mis sion and then continue to ISS for the com pletion of its mission. D