YAMAL SATELLITES for Gazprom Space Systems

In recent years ISS-Reshetnev has consolidated its hold on the telecommunications market significantly. The company's customer base has also expanded to include not only Russian but also foreign companies. The ISS team's expertise as well as a wealth of accumulated solutions grows from project to project. Among those that present a particular interest is the on-going Yamal program being implemented by ISS-Reshetnev for Gazprom Space Systems, one of Russia's largest satellite operators.

Gazprom Space Systems is a company that creates industrial information space systems based on the principles of commercial return and attraction of extra-budgetary funds.

The history of the Yamal program goes back to 2008, when Gazkom (now Gazprom Space Systems) announced a tender competition for the manufacture of two Yamal-400 spacecraft. ISS-Reshetnev prepared a tender offer and entered the bidding process. In fierce competition with Russian and foreign companies, the Siberian satellite manufacturer managed to win the Yamal-401 project.

Prior to the Yamal-400 program, Gazprom Space Systems had awarded a contract for the Yamal-300 program, i.e. the Yamal-301 and Yamal-302 satellites, to S.P. Korolev Rocket and Space Corporation "Energia". However, the implementation of the program did not go smoothly, and as a result, Gazprom Space Systems broke the contract. Under the circumstances, the Reshetnev Company proposed to install two repeaters originally intended for the Yamal-301 and Yamal-302 satellites into one of ISS-Reshetnev's platforms, in particular, Express-1000H. Gazprom Space Systems got interested. During the 2008-2009 winter months, all the preliminary procedures, details and agreements were finalized. In May 2009 the two companies signed a contract for the manufacture of the Yamal-300 space complex to be based on the Yamal-300K spacecraft. On July 17, 2009 the contract entered into force.

In accordance with the terms of the contract ISS-Reshetnev is responsible for the development and manufacture of the Yamal-300K telecommunications satellite and the associated ground control systems. Once placed into the geostationary orbit at 90° E, the Yamal-300K satellite will provide C- and Ku-band services to Russia and the CIS countries. Equipped with 26 transponders it will have enough capabilities to offer end-users a complete spectrum of modern communications services.

The advanced satellite platform Express-1000H will ensure the spacecraft the following technical parameters:

- A lifespan of 15 years;
- A platform mass of 450 kg;
- 5600W of power supply;
- Rejection of up to 3500 W of waste heat.

These platform parameters are sufficient enough to enable ISS-Reshetnev to accommodate the repeater equipment originally projected for two different satellites aboard one spacecraft. The complete satellite will weigh approximately 1700kg, which will allow the company to launch it in tandem with the TELKOM-3 spacecraft (currently in production at ISS-Reshetnev) aboard a Proton-M rocket.

The main advantage of the Yamal-300-K project is its reduced order-to-delivery cycle time, which is mainly due to the fact that the equipment for the payload and the ground control segment was manufactured within the initial Yamal-300 program.

Today's competitive environment requires that satellites be developed

and manufactured within 24-30 months. These are rather tight schedules. With Yamal-300K, the order-to-delivery time has been reduced by another 4 months so as to launch the spacecraft together with the TELKOM-3 satellite whose production started much earlier. As Yamal-300K is based on ISS-Reshetnev's standardized Express-1000H platform (also used in the AMOS-5 and TELKOM-3 projects) the volume and the time of design work will be reduced. Yet, with a number of other spacecraft simultaneously in various stages of manufacture, ISS-Reshetnev will definitely have a busy period trying to be on schedule for the spacecraft launch in 2011.

The original repeater equipment designed and manufactured for the Yamal-301 and Yamal-302 satellites was made to fit a different satellite platform and therefore, has different interfaces. In addition to the obvious integration and combination problems, there will be also difficulties in adapting the payload to the platform, as the payload, or to be more exact, its elements are complete and are subject to no change. These discrepancies include different (platform vs. payload) voltages, interference spectra in electrical lines, mechanical load levels, levels of radiation tolerance, etc. To meet the challenge and successfully integrate a payload into the platform, the company will have to develop additional means, such as power supply units for the communications payload, and conduct additional testing. However, the necessity for additional activities reduces the effect of the standardized platform.


Signing the production schedule for the Yamal-300K spacecraft

The Yamal project is also unusual in terms of work distribution. Thus, Gazprom Space Systems, the customer, will supply a payload, a ground control station and other subsystems intended for the ground control segment. The Reshetnev Company, besides manufacturing a payload module structure, which is a company's typical "contribution", will be also engaged in the creation of a number of PLM elements, such as antennas, power supply units, onboard control, waveguides and the low-frequency cable system. This is a new field of activity for ISS-Reshetnev and there is no doubt that the new experience the company is gaining in the Yamal project will definitely contribute to the success of its future programs.

The same work distribution pattern is followed in the organization of work on the ground control segment. Thus, besides having some ready-to-use control equipment, the customer is also taking part in the creation of the mission-critical onboard and ground control equipment as well as some systems, which also required making changes in the platform's original structure and the responsibility pattern.

Yamal-300K is the first joint project of ISS-Reshetnev and its new customer, Gazprom Space Systems. The second joint project, Yamal-401, is to start quite soon. Yet, the Reshetnev team hopes to go beyond these and make a greater contribution to the customer's fleet. Thus, Gazprom Space Systems has 5 orbital positions in the geostationary orbit, but only three of them are occupied. Besides, the Yamal-100 satellite is completing its designed orbit lifetime. Finally, the Reshetnev Company is currently involved in the development of the joint multifunctional satellite system Arctica intended to provide communications services in the Arctic Region via HEO satellites.


Discussing the progress of work under the Yamal-300K project with the customer's representatives

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