

Swedish Space Corporation

Three decades of experiences with space

When Swedish Space Corporation (SSC) was chosen as prime contractor for the SMART-1 satellite in 2000, its long experiences from developing, constructing, launching and managing Swedish national satellites weighed heavily. As far back as in the early 80s, SSC entered the market of developing satellites such as the scientific satellite Viking, and the communication satellite Tele-X.



SMART-1 fit check on Aiane 5 adapter
Photo: SSC

That era can best be described as involving technology completely new and unfamiliar to most industries. After the successful launch of the above-mentioned satellites, followed by several successful years in orbit, SSC has since then actively participated as prime contractor in scientific satellites such as Freja, Astrid and at last the Odin satellite. By managing these projects, though many

in close co-operation with international partners, the company has achieved an important insight in managing international industrial teams. This proved incredibly valuable when ESA decided who should become prime contractor for the SMART-1 project as well as managing phase A for the earth observation satellite ACE+.

Swedish Space Corporation (SSC), owned by the Swedish government, was established in 1972, and today holds about 350 employees. The basis for the activities is to apply their business ideas to the world market:

- Space and airborne system.
- Launch of rockets and balloons as well as testing space and airborne systems based on Esrangle.
- Communication and control services for satellites.

Four business units carry out the company's operations:

- Esrangle Division
- Satellite Operations Division
- Airborne Division.
- Space Systems Division

The Esrangle Division develops and sells sounding rocket and balloon launching services as well as ground based observation services. In addition services are offered in the area of unmanned airborne and space vehicles. The Esrangle Division is responsible for the daily operation of the Esrangle site with all basic services connected to the operations. SSC also markets Kiruna Airport and Arena Arctic by contract with the Swedish Civil Aviation Administration.

The activities at Esrangle are based on the very large and sparsely populated areas north of the base, an area that is well suited as impact area for sounding rockets. Launching of sounding rockets was also the main reason for the establishment Esrangle in the mid-60s. However, the activities have been extended almost ever since then and today the division can offer a variety of space-related services.

The Satellite Operations Division includes Esrangle satellite station, operation of ESA's satellite station at Salmijärvi and the satellite control station at Esrangle. Operations of the stations are mostly

carried out within the framework of long-term contracts with ESA and other international space organisations such as the French CNES and SPOT Image, the Japanese NASDA and Nordic Satellite AB. The Swedish satellite Odin and its predecessors have also been monitored and controlled by the Esrange satellite station. SSC is close to signing an agreement with CNES for a long-term co-operation in order to establish a new ground station at Esrange for the French mini/micro satellite programme. Since the end of 1999 SSC has been part owner in the US company Universal Space Network Inc. (USN). Together they develop the PioraNet to be able to provide global satellite data services.

The Airborne Division, located at the company's engineering centre in Solna outside Stockholm, develops, delivers, and supports Maritime Surveillance Systems (MSS) for coast guards and pollution authorities around the world. The MSS is a field-proven airborne remote sensing system for protection of the economic zone, oil spill tracking, fishery surveillance, ship traffic control and search and rescue. The MSS is a user-friendly system, which combines information from a number of different sensors and photographic and video cameras.

Space Systems Division.

The Space Systems Division, located at SSC's Space Engineering Centre in Solna outside Stockholm, is mainly known for design and construction of space qualified equipment of different types, and for being the prime contractor for small satellites. The Odin satellite, the latest national Swedish project, has spent nearly two years in space and still delivers large amounts of data for the scientific community. After the successful launch of Odin, the space division has been the prime contractor for ESA's space probe SMART-1, a job SSC won mainly due to long experience in managing, developing and constructing small satellites, as well as its experience managing international industrial teams. This spring the Space System Division was chosen as prime contractor for phase A for ESA's earth observation satellite ACE+, a mission with four satellites in two different orbits around earth.

The products and services the Space Systems Division offers can mainly be grouped like this:

- Small satellites and micro satellites
- Micro gravity experiments for sounding rockets and orbital vehicles
- Subsystems and equipment for satellites and sounding rocket systems.



The ESRANGE Headquarter near Kiruna in the northern part of Sweden.

Photo: SSC

- Sounding rocket payload systems and entire vehicles
- Ground support systems for space vehicles
- Specification & procurement support for telecom satellites.

The first satellite managed by SSC was the Viking satellite, with its primary task to study the acceleration region of auroral particles. This satellite was developed by Saab and Boeing, was launched in 1986 and gave SSC and the rest of the space-related industry in Sweden valuable experience in developing, constructing, launching and managing, thus setting an example for the following Swedish Small Satellite Programme. Since then, SSC has managed the telecommunications satellite project TELE-X and been the prime contractor for Freja, Astrid 1 and 2 and most recently the Odin satellite. SSC has in different ways delivered avionics, electronic and software to the same satellites. In addition, they have carried out tests and verification of the satellites.

Sven Grahn, Vice President, Engineering and Corporate Communications at SSC, told us that working with Odin won them contract managing the industrial team for SMART-1. It was a project quite similar to that of Odin, both in terms of size and degree of difficulty.

He also stated that SSC Space Systems Division has a separate programme for developing new technology. "Developing new techniques is concentrated around three main areas, advanced avionics, attitude software and small rocket motors for stabilising satellites. That will ensure our



Recovery of payloads by helicopter is carried out within one hour after launch.

Photo: SSC.



SMART-1 System Unit, developed within the Space System Division.

Photo: SSC.

position in the technological forefront. Today we are close to eighty persons engaged with the Space Systems Division, most of whom are educated at a high technological level, and today, even after the IT-boom, recruiting highly educated personnel to our company is not a problem”.

Another important factor that ensured SSC the contract for SMART-1, was in addition to SSC’s own competence, to correct the industrial return from ESA. However, the phase A study for ACE+ was won exclusively because of SSC’s own



An early winter morning preparing a balloon campaign at ESRANGE.

Photo: SSC

competence. SSC has also the necessary competence and experience to construct commercial satellites, but the chance of that happening is of yet far ahead. Owing to the fact that most of the satellite projects SSC has managed nationally, the list of participation

is very international. “I therefore believe”, says Sven Grahn, “that SSC, with the Space Systems Division, is an attractive partner in future international satellite project, too”.

“Today”, Sven Grahn says, “we carry out some preliminary studies for a possible new Swedish small satellite project called PRISMA, both for a scientific and for a technological mission. We hope one of these can be realised in the near future and thus create the basis for further development of the Space Systems Division”.

SSC started its micro gravity programme in 1975. Already from the start SSC has been working in close contact with the scientists to provide cost-efficient solutions and superior service. Experiment equipment has been designed and delivered for sounding rockets, for GAS canisters on the space shuttle and for aircraft in parabolic flights. SSC offers a full range of capabilities from consulting services to turnkey, tailor made systems like project studies and management, development of experiment equipment, flight and operations.

SSC has up till now been responsible for designing sixty sounding rocket vehicles since the early 1970s. These vehicles have been used for auroral studies, atmospheric physics, astrophysical observations and micro gravity research, both within the Swedish national space programme and as part of the micro gravity research programme of ESA.

The Science System Division designs entire sounding rockets based on existing motors. The company can analyse the trajectory, calculate the loads on the vehicle and its stability. They also design some structural parts of the vehicle, like interstage adapters and nose shrouds. In addition they can build service modules with telemetry and telecom and support devices for the science experiments like deployable booms and other mechanisms.

The experience SSC has made for itself throughout all these years as well as important projects, provide great possibilities to give advice and support to others in the market. They have therefore initiated the Satellite Procurement and Consultancy Services within in-orbit hardware like satellites, geo stationary resources such as frequency rights and supporting ground infrastructure for supporting any satellite purchaser. The services they can provide are feasibility and system definition, international frequency co-ordination, procurements and negotiations, risk assessment and insurance procurement, launch vehicle and campaign consulting, support for mission control centres, and satellite production monitoring.