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ONEWEB
AWARDS GMV CONTRACT TO DEVELOP ONEWEB’S SATELLITE CONSTELLATION COMMAND AND CONTROL
GLOBAL SOLUTIONS FOR THE SPACE SECTOR
PUSHING BACK THE LIMITS

We at GMV do all within our power and knowledge to provide our space clients with the best possible answers to their needs. With a track record of over 30 years behind it, GMV has built up a reputation as a reliable and proactive partner, always on hand and working as a team in search of groundbreaking solutions that input added value and enable the sector to take on the constantly changing challenges with complete success.

Over the years GMV has had the chance to work with space agencies, satellite operators and satellite manufacturers all round the world, furnishing them with systems, products and support services. It has by now become one of the world’s top suppliers within the sector. Our space applications and systems are now meeting the needs of a continually growing community of users in different activity sectors.
OneWeb awards GMV Contract to Develop OneWeb’s Satellite Constellation Command and Control

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Active GMV participation in EGS-CC, the ESA’s new ground infrastructure

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GMV will deliver the EUMETSAT (EPS-SG) ground system

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Thales Alenia Space-Italy takes up GMV’s mission planning system for the second generation of COSMO-SkyMed satellites

Latest News

GMV GROUND SEGMENT NEWS

For yet another year, GMV has been able to maintain its world leading position in the satellite control center market. With the new orders recently signed, our cumulative number of customers has been expanded to 34 satellite operators that have selected GMV as ground segment provider for a total of more than 350 satellites. Today almost 250 of these satellites are operational and are being flawlessly controlled with GMV satellite ground segment systems.

After more than 30 years in the satellite ground segment business we perfectly understand our customer needs in terms of robustness, reliability and performances to ensure service continuity, integrity and effective operations. Our business model is based on flight-proven products that cover the complete operational needs of our customers, including real time TM/TC systems, flight dynamics, ground stations M&C, mission planning, payload/capacity management, etc. Our products provide off-the-shelf support for controlling the spacecraft buses of the main spacecraft manufacturers, including Airbus, Thales Alenia Space, OHB, Boeing, Lockheed Martin, ISS Reshetnev, MELCO, OrbitalATK and Space Systems Loral.

We are making considerable investments in our product portfolio to make them better and richer, including new features in line with the needs of markets like large fleet management, new advanced/flexible payloads management, full electric propulsion and collision risk assessment services, among others. We are also investing heavily in the next-generation core of our products, using the most advanced software engineering disciplines and tools.

With space becoming increasingly crowded, we also develop new systems and services to assess the risk of collision or radio interference, performing the required avoidance maneuvers. Of course, Megaconstellations is a key area where we are making a quantum leap and are nowadays developing for OneWeb, for the first time in history, a single satellite control center that will be able to fly a thousand spacecraft.

Our ambition is to continue serving our existing customers, win new customers and provide them with better products to support their operations in the most effective way. You can count on GMV.

JORGÉ POTTI
GENERAL MANAGER-AEROSPACE
OneWeb awards GMV Contract to Develop OneWeb’s Satellite Constellation Command and Control

Global satellite telecommunications company, WorldVu Satellites LLC d/b/a “OneWeb”, builder of the largest satellite constellation in history, has awarded GMV a contract to develop the Command and Control (C2) element within the ground system for OneWeb’s massive satellite constellation. GMV, undisputed leaders as providers of GEO telecommunication satellite control systems, now undertakes a new challenge of monitoring and controlling a constellation of nearly 900 Low Earth Orbit (LEO) satellites, by far the largest ever global satellite broadband system.

The C2 element will be installed in an operations center in the United Kingdom and another center in the United States, and will provide telemetry and telecommand processing, automation of the contacts between the vehicles and the ground antennae, as well as full constellation situational awareness.

The contract involves the supply of various products from GMV’s real-time suite including *hifly* for satellite monitoring and control, *flyplan* for contact automation and a new product called *fleetDashboard* to provide situational awareness of the complete satellite constellation from a single location, now being developed in close cooperation with the OneWeb operations team.

A key factor in the selection of GMV as C2 provider was the unmatched flexibility of its products that will not require significant reengineering to meet the OneWeb business needs and schedule. In particular, *hifly* supports both GEO and LEO satellites out-of-the-box as well as the Consultative Committee for Space Data Systems (CCSDS) Packet Utilization Standard (PUS) used by the vehicles. Also, all involved GMV products are compliant with the strenuous automation requirements imposed by OneWeb concept of operations. Finally, GMV’s fleet-management products are being complemented with excellent situational awareness capabilities to allow for efficient operations. OneWeb
OneWeb’s mission is to enable affordable Internet access for everyone. OneWeb and has received backing from major companies including Qualcomm, Virgin, Airbus, Bharti Group, Hughes, Intelsat, Coca Cola, Grupo Salinas and MDA. OneWeb is building a communications network with a constellation of low earth orbit satellites that will provide connectivity to billions of people around the world. Their system will extend the networks of mobile operators and internet service providers to serve new coverage areas, bringing voice and data access to businesses, schools, healthcare institutions, consumers, and other end users.

For more information: visit www.oneweb.net or email press@oneweb.net.

will use SPELL as one of the primary automation languages and will use the GMV’s comprehensive API (Application Programming Interface), enabling its low-risk integration into the overall ground system.

“OneWeb is excited to work with a recognized industry leader like GMV”, said Suzi McBride, OneWeb Senior Vice President. “Our Fleet Management team evaluated a large number of C2 platforms against a challenging set of requirements and were impressed by GMV’s suite of products, their adaptability to our unique and complex needs, and their willingness to work closely with our team to achieve our operational objectives.”

“GMV is extremely motivated to work hand by hand with OneWeb and address together the phenomenal technological and operational challenge represented by such a large satellite constellation” said Jorge Potti, General Manager of GMV’s Aerospace sector. “We are convinced that the project will result in a quantum leap in our satellite command and control technology.”
GMV invests in PLD Space

GMV has decided to back the project of PLD Space and take a stake in this young space company. GMV will also develop key technology and work jointly with PLD Space in the development of the launchers ARION 1 and ARION 2, boosting the growth of both firms and winning them pole position in the market of small space launchers.

GMV’s corporate backing of PLD Space has freed up a total investment of 6.7 million euros, counting both private investment though an investment fund and a “family office”, both hosted in Valencia Region, and public funding with contributions from CDTI, ENISA, SUMA Teruel, IVF and the European Commission’s SME Instrument.

Under this agreement, GMV, a benchmark firm in the world’s space sector, will be inputting its 30+-year experience and expertise in the sector to develop the complete avionics of ARION 1 and ARION 2, including guidance, navigation and control (GNC), telemetry and onboard software of both launchers. GMV’s team will also be participating jointly with PLD Space in ARION 1 and ARION 2’s integration, qualification and launching-support operations, all during the phase of trial flights and commercial flights. These operations are scheduled to start in late 2018 with the maiden flight of the suborbital launcher ARION 1 from the “El Arenosillo” launch base in Huelva.

ARION 1 will have two purposes that are crucial for the success of this business initiative. At a commercial level, this rocket will serve as an economical and reusable space access vehicle, for technological development and scientific experimentation in space conditions. At a technological level ARION 1 will be the technological demonstrator and forerunner of a much bigger and more ambitious vehicle, ARION 2, whose mission will be to place satellites of up to 150 kg in space orbit.

With this investment PLD Space will begin the complete development of ARION 1 as well as the necessary facilities for its manufacture, integration, testing and launch. PLD Space’s head offices are currently located in the Science Park (Parque Científico) of the Universidad Miguel Hernández (UMH), while the propulsion testbeds are in Teruel airport. During 2017 the firm moved into its new rocket- and satellite-manufacture and -integration workshop in Elche. PLD Space is also building new testbeds in Teruel to trial its new rocket engines as well as complete rockets for fine tuning before blasting off into space.
ESA awards GMV the Mission Control System of the ExoMars Rover Surface Platform

THE DUAL-MISSION EXOMARS PROGRAM HAS BEEN DEVELOPED BY THE EUROPEAN SPACE AGENCY WITH THE AIM OF INVESTIGATING THE MARTIAN ENVIRONMENT AND TRIAL NEW TECHNOLOGIES PAVING THE WAY FOR A FUTURE MARS SAMPLE-RETURN MISSION IN THE 2020S

ExoMars will demonstrate key flight and in-situ enabling technologies in support of European ambitions for future exploration missions and will carry out fundamental scientific research.

The first ExoMars mission, consisting of the Trace Gas Orbiter and a demonstrator Entry and Descent Module, was launched in 2016. The second mission, scheduled for 2020, will consist of the ExoMars RSP mission. The launch configuration is the SCC (S/C Composite), comprising the Carrier Module (CM) and the Descent Module (DM). The CM is jettisoned upon arrival at Mars, and the DM will enter the Mars atmosphere and land. The DM carries inside it the two scientific elements: the Surface Platform (SP) and the Rover. The Carrier and Rover are being developed by ESA while the Descent Module and Surface Platform are being developed by Roscosmos with ESA contributions, drawing on some of the key technology developments and the demonstration performed with the 2016 ExoMars EDM.

The ExoMars RSP will be operated by ESA Operations Centre (ESOC) in Darmstadt (Germany) which has awarded GMV a contract for the development and subsequent maintenance of the Mission Control System (MCS), which is responsible for spacecraft monitoring and control functionality within the ground segment.

This contract reinforces the lead position of GMV in the provision of satellite MCSs not only for ESOC (where GMV is provider for most of ESA’s Earth Observation missions and also of planetary exploration missions like Bepi-Colombo and Solar Orbiter), but also in the European institutional market (where GMV is also provider for the EUMETSAT Sentinel-3, MTG and EPS-SG missions). This predominant position in the institutional market complements GMV’s prime position in satellite operators’ commercial market worldwide.

The RSP MCS project adds to other important developments GMV is carrying out for the ExoMars 2020 mission, namely the Rover Operations Control Centre for the rover operator Altec, in Turin, as well as space segment projects like the application Software and its SW Verification Facility (SVF) of the onboard Guidance Navigation and Control, Power and Thermal subsystems, among others.
Fleet Management for the global satellite operator Arabsat

Arabsat had decided to establish a more direct and long-lasting partnership with GMV as a specialist Satellite Control Center (SCC) vendor and move to a more homogenous, flexible and robust system that enables seamless operations of various satellite platforms with an increased level of operational reliability.

GMV and Arabsat signed a contract for installation of a complete SCC comprising RTS and FDS systems for its existing and upcoming fleet of satellites.

This contract takes in the supply of a turnkey solution comprising a real time system (RTS) for monitoring and control based on hifly® and a flight dynamics system based on focusgeo, both inhouse GMV products. The new systems will be grafted onto the fleet control applications, likewise based on inhouse GMV solutions; between them all they will then ensure centralization of fleet operations and provide an unprecedented degree of automation.

This new contract award will help forge an even closer partnership between GMV and Arabsat, a relationship that now dates back more than ten years; it will also consolidate our leadership worldwide as ground control systems supplier for commercial telecommunications operators.

GMV broadens its participation in Meteosat Third Generation products and applications

The Meteosat Third Generation (MTG) system is being established through cooperation between the European Space Agency (ESA) and EUMETSAT, the European consortium for operating meteorological satellites. As such it represents a broadening of the global- and regional weather forecasting and atmospheric-monitoring capabilities of its forerunner Meteosat Second Generation (MSG).

GMV is currently contributing to the MTG mission with the design, development and validation of the prototype processing for MTG imaging satellites, and the integration of the MTG sounding satellites prototype, to enable processing within a common framework.

The new MTG series will include six satellites installed on two different platforms, MTG-I and MTG-S.

Thales Alenia Space France and EUMETSAT have once more turned to GMV’s expertise in operational processing awarding it the development of the MTG Instrument Navigation and Registration (INR) operational processor for the sounding satellites (MTG-S) under the MTG mission.

The purpose of GMV’s activities is to provide the operational processors for the Lightning Imager (LI) instrument. LI is an optical payload with onboard data processing for detection of lightning optical pulses. LI will detect and locate lightning over almost the whole Earth disk (geostationary orbit) operating in any illumination condition (day and night).
Eutelsat entrusts GMV with its next four missions

Eutelsat is now one of GMV’s flagship clients, running GMV-developed systems for controlling its whole satellite fleet, pride of place going to the multi-satellite control system hifly® and the flight dynamics system focusGEO.

The long-lasting and solid relation between GMV and Eutelsat, dating back to the first contract award in 1993, has been forged largely by a great number of hardworking people who have spared no effort to achieve top-quality results. This team has been renewed over time but has managed not only to keep up this unflagging, never-say-die spirit but also boost the business carried out for Eutelsat.

Avant Project, as the project has been called, represents the first GMV development for Eutelsat involving the almost simultaneous implementation of four new satellites. This poses a stiff challenge at both technical and managerial level, for which GMV will draw on synergies from other inhouse GMV developments of both the focus and hifly® families. The project’s roadmap also provides for the use of agile development methodologies with the goal of ensuring the best use of GMV resources and to guarantee fulfilment of Eutelsat’s operational, functional and quality goals.

Avant Project will run up to early 2019 and support Eutelsat operations for the following four satellites:

**African broadband** broadband satellite of Thales Alenia Space based on the new Spacebus Neo platform. Like Quantum, it provides a telemetry and telecommand transmission protocol based on ESAs Packet Utilisation Standard (PUS). This African broadband satellite is to be launched in 2019.

**Eutelsat 5 West B**, the first Eutelsat satellite of the manufacturer Orbital ATK with a GeoStar2 platform and an Airbus Defence and Space payload. Also to be launched in 2018.

**Eutelsat Quantum** of the manufacturer Airbus Defence and Space (ADS) in the UK with a platform made by its subsidiary Surrey Satellite Technology Ltd. (SSTL). Quantum is the first satellite to allow complete onboard reconfiguration.

**Eutelsat 7C** built on Space Systems Loral’s Omega 3 platform, due to be launched in Q3 of 2018 to give broadband coverage to Europe, Africa, the Middle East and Turkey.
Active GMV participation in EGS-CC, the ESA’s new ground infrastructure

The European Ground Systems – Common Core (EGS-CC) is a European initiative to develop a new ground software infrastructure for the Monitoring and Control (M&C) of space systems. The initiative was initiated in 2009 by ESA and is currently supported by the European System Integrators, including AIRBUS Defence and Space, Thales Alenia Space and OHB System and also by the French, German and UK national space agencies, CNES, DLR and UKSA.

The EGS-CC is intended to be used in the spacecraft Assembly, Integration and Testing environment, as well as in actual flight operations. The system will therefore allow for a smooth transition between both environments in terms of databases and procedures, which in turn will reduce risks and costs. It is thus envisaged that the wide variety of systems currently used for AIT and operations will be reduced to systems based on a common kernel used throughout phases by subsystemists, integrators, and operations teams.

EGS-CC

The EGS-CC is a “Core”; this means that it will provide the basis for the actual M&C development adapted by extension to user needs and the mission itself. The EGS-CC will however remain as a core that provides the level of commonality that ensures the aforementioned synergies and advantages. The EGS-CC C/D phase is funded under the ESA GSTP program with contributions from a large number of countries, among them Spain with a very significant contribution.

EGS-CC is currently at the beginning of its more than 4-year C/D Phase and is being developed by a multinational consortium of around 20 companies. GMV is playing an important role with an active participation in system-level activities and two engineers in the System Architects and Integration and Validation teams, as well as being responsible for the implementation of three important components. The EGS-CC is based on a layered architecture and makes use of state-of-the-art technologies. In addition to GMV’s participation in the EGS-CC development itself, the GMV branch in Portugal is also starting a GSTP study to analyze the impact of the new EGS-CC in the existing ESTEC Avionics Test Bench used for space systems testing.

CNES turns again to GMV’s experience

For over 6 years now GMV has been collaborating with France’s National Centre for Space Studies (Centre national d’études spatiales: CNES) in all the following tasks: mission simulators and analysis; algorithm libraries; mission centers and spacecraft control centers; science-data and image processing; operational flight dynamics. This collaboration has been carried out within the framework contracts ACIBS and ACIS that GMV signed with CNES in 2011.

Each framework contract, pooling a set of Space areas or themes, is the instrument used by CNES “services” or departments to launch restricted calls for tenders for those activities that need the collaboration of private firms to complete the mission concerned. A framework contract entitles the holder to be included in CNES’s continuous consultation process for a set period of time.

In 2017 CNES invited tenders for the renewal of both framework contracts and has also launched a consultation for new activities, covering not only software development and maintenance but also technical assistance. After this consultation, in which GMV has competed with the main Space firms, CNES once more turned to GMV for renewal of the framework contracts now called ACCIOME-S1 and ACSIS and has also awarded the firm a new framework contract, ACCIOME-S3.

After this renewal GMV will be priming ACCIOME-S1 and acting as subcontractor in ACSIS. Apart from mission analysis, ACCIOME-S1 has added on new mission-programming tasks. Within ACCIOME-S3 GMV will also be able to opt for onboard software development, command and control and operations in control centers both in flight dynamics operations (FDS) and payload and satellite platform.

The renewal of the framework contracts ACCIOME-S1 and ACSIS is key for the continuation of work being carried out by the flight-dynamics unit for CNES and will not only allow GMV to maintain the projects underway, currently involving a score of engineers, but will also give it a chance to win new contracts in this area. Winning the ACCIOME-S3 contract has also represented an important landmark, giving GMV access to the development of onboard software for instruments.

Particularly GMV is playing a major role in the development of SIRIUS, the new generation Flight Dynamics concept under development by CNES, fully based on JAVA.
Rosetta’s mission comes to an end


The mission culminated with a descent towards a region of active pits on the comet’s ‘head’. The region, known as Ma’at, lies on the smaller of the two lobes of Comet 67P/Churyumov–Gerasimenko. It is home to several active pits more than 100 m in diameter and 50–60 m deep.

Rosetta got its closest look yet at these fascinating structures: the spacecraft targeted a point adjacent to a 130 m-wide, well-defined pit that the mission team was informally named Deir el-Medina, after a structure with a similar appearance in an ancient Egyptian town of the same name.

Like the artefacts found inside the Egyptian archaeological site that tell historians about life in that town, the comet’s pit contains clues to the geological history of the region. Rosetta targeted a point very close to Deir el-Medina, within an ellipse about 700 x 500 m.

From one month, Rosetta was flying elliptical orbits that brought it progressively closer to the comet. One month after when the flyover was completed, a short series of maneuvers was performed to line Rosetta up with the target impact site. On its closest flyby, Rosetta came within 1 km of the surface, a distance never reached before.

On 30 September all spacecraft operations ceased; from this moment on, teams began to concentrate solely on scientific questions.

GMV has played a key role in the Rosetta mission from the word go. Both the entry into orbit and the landing of a soft-touchdown lander (Philae) on comet 67P/Churyumov-Gerasimenko were controlled from Earth by a team of engineers, with a crucial role being played by GMV. The company sent some of its staff to the Rosetta Science Operations Centre within the European Space Agency’s European Space Astronomy Centre (ESAC/ESA) in Villafranca del Castillo (Madrid), to ESA’s European Space Operations Centre (ESOC) in Darmstadt, Germany, and to the Control Center of the French Space Agency (Centre National d’Etudes Spatiales: CNES) in Toulouse, France.

GMV also played a key role in the initial mission analysis stage since years before the actual launch. Among other activities it also participated in the planning of scientific operations, planning control of three instruments and preparation of the operations for the main mission phase (the comet phase).

GMV personnel posted to France performed maintenance of the calculation tools used by CNES’s control center to calculate necessary illumination and visibility criteria to decide the comet landing point and also the possible descent trajectories of the Philae soft touchdown lander.

GMV’s personnel posted to Germany, for their part, participated since 2004 in flight dynamics operations, specifically trajectory control and generation of the necessary commands for controlling the probe’s orbit and attitude. For comet approach operations GMV’s flight dynamics team were carrying out additional tasks: design of approach-, orbit- and descent-trajectories; processing of images from Rosetta’s onboard cameras and estimating the comet’s navigation-affecting characteristics. GMV’s personnel were carrying out this series of activities until right up to the end of the spacecraft’s operations.
**focusoc: Commercial Collision Avoidance Service based on JSpOC SP Catalogue**

Over the last few years the Space Debris field has drawn satellite operators’ attention due to the growing population of uncontrolled objects orbiting the Earth, all of which pose an increasing risk of collision with operational satellites. To mitigate this major threat GMV has started to provide some of its customers with a service from its focusoc (focus Operations Center) based on an ad-hoc augmented catalogue derived from the Special Perturbations (SP) catalogue provided by JSpOC (Joint Spacecraft Operations Centre).

GMV is targeting a cost-effective solution tailored to customer needs (in terms of availability, accuracy, timeliness, etc.) while avoiding superfluous functionalities and excessive performances not required for the delivery of a set of Conjunction Assessment (CA) and Collision Avoidance (COLA) services perfectly suited to their needs.

The main objective of the CA service is to detect upcoming conjunctions of operational satellites with other space objects, assess associated collision risk and support collision avoidance operations in case of high probability. A second service level can be activated upon demand and consists of the collection of optical data for collision risk assessment refinement.

The focusoc services are available through the service desk with 24x7 access for operators. Additionally, GMV provides specific manned support on a daily basis, mainly by email and telephone. At present GMV is providing this service in a trial period. Ten satellite operators are currently assessing the focusoc service. GMV will continue investing effort in this initiative to satisfy the high expectations generated among the satellite operator community.

**Copernicus´s POD service is declared to be operational**

THE PRECISE ORBIT DETERMINATION (POD) SERVICE DEVELOPED AND OPERATED BY GMV FOR THE SENTINEL-1, -2 AND -3 MISSIONS OF THE COPERNICUS PROGRAM OF THE EUROPEAN COMMISSION (EC) AND THE EUROPEAN SPACE AGENCY (ESA) OFFICIALLY DECLARED TO BE OPERATIONAL

The service operates routinely and continuously to the client’s entire satisfaction, using mission data on a 7x24 basis from GMV’s central site in Tres Cantos near Madrid. This service is capable of processing state-of-the-art satellite tracking techniques (including GPS and laser) and providing orbits at different levels of precision and response time, ranging from quasi real-time solutions to offline solutions of higher, centimetric precision. This level of precision is needed for reconstructing the radar missions of the Sentinel-1 mission. In 2015 this service will increase its capacity with the launch of the satellites Sentinel-2A and Sentinel-3A.

Precise Orbit Determination (POD) has traditionally been an area of expertise reserved for research institutes and space agencies. The reason for this is the detailed and complex modelling needed to achieve the required accuracies and state-of-the-art tracking techniques involved. Very few firms have yet developed the required expertise in this field, so GMV now boasts a clear industrial leadership in these activities.
GMV will deliver the EUMETSAT (EPS-SG) ground system

GMV has been chosen by EUMETSAT for designing, developing, validating and deploying the Mission Control and Operations (MCO) sub-segment of the ground system of the EUMETSAT Polar System Second Generation (EPS-SG) programme.

EPS-SG is Europe’s contribution to the Joint Polar System (JPS), which EUMETSAT establishes jointly with USA’s National Oceanic and Atmospheric Administration (NOAA). The EPS-SG will play a key role in weather forecast and climate observation, by enhancing observations of the Numerical Weather Prediction (NWP) models.

EPS-SG will comprise two parallel series of three satellites (Metop-SG A and Metop-SG B) carrying different instrumentation. In the framework of a cooperation arrangement with EUMETSAT, the satellites including a number of instruments will be developed and procured by the European Space Agency (ESA), with contributions from the French and German space agencies, CNES and DLR, respectively. EUMETSAT, for its part, is the EPS-SG System Authority and responsible for the procurement of the Overall Ground Segment, Launch and LEOP (Launch and Early Orbit Phase) services and for operating the satellites for 21 years from 2021 onwards.

Within the contract awarded by EUMETSAT, GMV has full end-to-end responsibility for the MCO, leading a consortium in which Zodiac Data Systems, European leader in TT&C stations, is responsible for the antenna; SCISYS inputs its experience in the rollout of operation-automation solutions for satellite control systems; while CELIS’s particular contribution stems from its in-orbit test (IOT) systems experience.

As prime contractor and consortium leader, GMV is responsible both for the subsystems making up the core of the MCO (Mission Control; Flight Dynamics; Mission Planning; Mission Operations Component Local Monitoring and Control, Generic Satellite Simulator, to be deployed at the TTC station for end-to-end data flow tests, and TT&C antenna monitoring and control) and the integration, validation and rollout of the whole system.

The MCO, together with the Payload Data Acquisition and Processing (PDAP) and the Multi-Mission Elements (MME), is one of the major building blocks of the EPS-SG’s Overall Ground Segment (OGS). The MCO will be responsible for the monitoring and control of the two Metop-SG satellite series. To implement this function, the MCO will consist of two components, firstly the S band station for Telemetry Tracking and Control (TT&C), located in Svalbard, and secondly, the Mission Operations Component (MOC) in Darmstadt (with a back-up system in Madrid).

The award of this contract consolidates GMV’s position as system integrating firm, an activity destined to play an increasingly important role in the space industry.
**Start of the operational phase of the Hispasat AG1**

On 2 June 2017, after completion of the commissioning phase, the Hispasat 36W-1 (AG1) satellite was officially handed over to the operations team, a watershed moment that marks the start of the satellite's operational life.

Launched on 28 January, Hispasat AG1 is the first mission of the SmallGEO platform developed by OHB System AG (Germany) with the European Space Agency and HISPASAT. The satellite features the innovative RedSAT regenerative payload, which will allow HISPASAT to use the satellite’s power more flexibly and efficiently, significantly boosting its transmission capability with the concomitant reduction of communications costs.

To support the 20 Ku-band transponders and up to 3 K-band transponders, GMV has supplied Hispasat not only with a groundbreaking active antenna with reconfigurable beams but also the latest version of its Smart family of tools: smart rings and smart beams. The former seeks payload configuration alternatives in the event of any component failure and the latter offers the user total control over antenna alignment configuration while also showing a 3D map of the antenna boresight for checking purposes.

Both tools are fully integrated with the multi-satellite control and monitoring system, hifly®, and with the flight dynamics system, focusGEO, both supplied by GMV. For this satellite, moreover, hifly® has incorporated support for ESA’s new telemetry and telecommand protocol called Packet Utilisation Standard (PUS), already being phased into the new satellite models by other manufacturers.

**GMV designs the onboard and ground components of future flight-control systems for space exploration missions**

This contract, awarded by the European Space Agency’s (ESA) Space Research and Technology Centre (ESTEC) to GMV (Spain, Poland and Portugal’s subsidiaries) and the consultancy of GMV staff in the European Space Operations Center (ESOC), has the goal of developing a framework that integrates and defines the FDS and GNC systems (which together make up the Flight Control System or FCS) and the respective interfaces.

The hugely successful ESA interplanetary missions - Rosetta and Exomars - have in great part been possible due to the high achievement standards of the ground segments’ FDS. Its ESOC teams are manned by GMV specialists, and it is responsible for controlling a wide range of aspects of spacecraft motion.

A higher level of automatic Guidance, Navigation and Control (GNC) components in the spacecraft (Space segment) will lighten the FDS burden: more autonomous operations will cut costs; while the lower reliance on long round-trip-time communication links, particularly for missions to distant bodies, will allow safer and more precise (thus more ambitious) maneuvers.

Only autonomous GNC permits the maneuvering accuracies required for precise landing and close observation. At the same time, the GNC system cannot run completely independently from the ground and requires some level of interaction between the FDS and the GNC.

The hybridization study, the sharing of authority as well as the optimal interface point between the two systems have so far been performed on the basis of very preliminary assumptions, with no solid navigation analysis, leading to sub-optimal strategy choices on which system design relies.

The activity will allow the study of the implications of hybridization, authority sharing, between the two systems by developing a framework that will simulate both the systems, which together make the Flight Control System (FCS). The framework will allow performance of the trade-off of different strategies in early mission phases; this will prove mission feasibility or will improve mission performance or reduce costs.

Once validated, the platform will be used for evaluating a possible mission scenario to a Near Earth Object (NEO), similar to AIM, and the electric propulsion orbit, raising (G2G) FDS mission strategies. For this mission, the analysis will be based on realistic assumptions arising from ESAs and the industry’s experience in recent and future missions.
KARI acquires GMV’s mission-planning system for its first moon mission

GMV’s inhouse mission-planning solution, flexplan, has been taken up by the (South) Korea Aerospace Research Institute (KARI) to be evaluated as the mission planning system for its KPLO moon mission.

KPLO (Korea Pathfinder Lunar Orbiter), set underway in the 2010s, will be the Korean Space program’s first lunar mission. After its launch, scheduled for late 2020, KARI aims to attain mastery of the necessary technologies for carrying out scientific research on the moon’s topography and resources. Once placed in orbit, KARI’s ambitious lunar program will then move on towards a second phase of landing a Rover carrying instruments for on-the-spot scientific analyses.

flexplan will provide KARI with continuous support not only for critical mission functions but also for mission support functions such as non-conflicting ground and Space segment scheduling, automation of ground pass scripts, building of stored command codes, onboard memory modeling, generation of activities reports and slew maneuver planning.

GMV’s solution support any complex mission. flexplan is now operating missions for the European Space Agency (ESA), the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), NASA Goddard Space and Flight Center and the United States Geological Survey (USGS) as well as the commercial operator Yahsat, to mention only a few.

Thales Alenia Space-Italy takes up GMV’s mission planning system for the second generation of COSMO-SkyMed satellites

In 2016 Thales Alenia Space was chosen by the Italian Space Agency (Agenzia Spaziale Italiana: ASI) to prime development of the program called COSMO-SkyMed (COntellation of small Satellites for the Mediterranean basin Observation) Second Generation, which includes a two-satellite constellation for dual military and civil use. Each satellite comprises a Synthetic Aperture Radar (SAR) for taking earth-observation images.

GMV’s inhouse mission-planning system, flexplan, has been acquired by Thales Alenia Space to be evaluated as the mission-planning system for this second generation of earth-observation satellites. flexplan uses an algorithm generator that allows flight and mission rules to be implemented, changed and vetted without recompilation. Due to this flexibility, it can be used for any type of mission (interplanetary or terrestrial orbit) and can be configured, deployed and integrated swiftly in the mission’s ground segment.

flexplan is an operational system already being used in missions similar to this program such as Sentinel-1, within the European Commission’s two-satellite Copernicus program, whose payload also comprises SAR instrumentation, or the PAZ satellite, which forms part of Spain’s National Earth-Observation Program (Programa Nacional de Observación de la Tierra: PNOTS).

This new acquisition means flexplan has now been taken up by yet another national space agency, to be added to the longstanding clients of ESA, NASA, EUMETSAT and the Korean Space Agency, among others.
GMV has been able to maintain its leading position in the satellite ground segment market, even increasing its presence with new customers and satellites.

New customers like GILAT, GlobalIP, PSN or KACST have been added this last year to our large portfolio of ground-segment users, providing solutions for ground stations M&C or Satellite and Orbit control.

In parallel we have expanded our business with existing customers, signing new contracts related to satellites like Star One D2 or Turksat 5A-5B, as well as the satellites GiSAT and PSN VI coming from the new customers mentioned above.

These recent news are the best example of our continuous ambition to serve our customers, providing them with advanced solutions to support their operations in the most effective way.

GMV is organizing the seventh “GMV User’s Conference” on ground segment solutions, GUC 2018, to be held on November 2018. Like its forerunners the conference will attract a turnout of diverse representatives from space agencies, communications-satellite operators and satellite manufacturers.

As previous editions, attendees will be able to share their operational experience and participate in debates and panel discussions on the sector’s burning issues and GMV will be giving out information and providing demos of its current product line in the ground segment.
GMV forms part of the industrial group that has worked on the mission’s ground segment, holding responsibility for setting up the control center, the precise tracking system and the planning system. GMV is also responsible for providing the radar-image-distribution and user-management system, both for civil and defense users.

GMV has set up the satellite control center as part of a wider-ranging project for the ESA and its European Space Operations Centre (ESOC). GMV has also been responsible for development of the satellite’s operational simulator used actively to vet the mission’s flight-control procedures and for pre-launch training of spacecraft operators.

GMV’s input to this mission is supply of the satellite control center (hifly®) and flight dynamics system (focusGEO). The technology multinational is not the only Spanish participator; Spain’s space industry has in fact made a crucial contribution to this mission.
GMV is playing a key role in the Copernicus program, participating actively in various projects for both the ground and Space segment. During launches it provides support services for the mission planning and control systems.

GMV has provided the flight dynamics system, developed from the focusGEO product and used as a benchmark for the orbital operations of the rest of Hispasat’s fleet; the satellite control and monitoring system using the hifly® product, GMV’s commercial solution for real-time satellite management; plus the payload management system, based on smartrings and management of the onboard antenna pointing system, by means of smartbeams.

GMV has developed the Hellas Sat 3 flight dynamics system and monitoring and control system. Both these systems have been developed from GMV’s inhouse focusGEO® and hifly® solutions, and have been successfully integrated and deployed in a modern and environmentally-friendly virtual environment using blade and vSphere servers. As well as the software, GMV is also providing training, support and maintenance for the system’s end users.

The project involved the development and implementation not only of the Neo-SCS control center, a version for Eutelsat of GMV’s hifly® product, but also of the flight dynamics system based on focus for its head offices of Iztapalpa and Hermosillo.

GMV has provided the flight dynamics system, developed from the focusGEO product and used as a benchmark for the orbital operations of the rest of Hispasat’s fleet; the satellite control and monitoring system using the hifly® product, GMV’s commercial solution for real-time satellite management; plus the payload management system, based on smartrings and management of the onboard antenna pointing system, by means of smartbeams.

GMV has provided the real time telemetry and command processing system based on its hifly® product plus three other ground subsystems: the flight dynamics system based on focusSuite, the ground segment control and monitoring system based on magnet and the payload management system based on smart rings.

Eutelsat, ran GMV-developed control systems for its complete satellite fleet, prime among them being the multi-satellite control system hifly® and the flight-dynamics system focusGEO. The launch of this satellite and its entry into service mark a new success story in the development of both satellite control systems.
GROUND CONTROL
FROM THE WORLD LEADER

EXPERIENCE SATELLITE GROUND CONTROL
In the last decade GMV provided ground systems for 40% of all commercial telecommunication satellites which were launched.

GMV’s flight-proven, product-based solutions have been selected to fly more than 350 spacecraft from 6 continents and 25 countries. Space institutions, commercial operators and space integrators trust GMV’s solutions to deliver robust and reliable control.

- flexplan: Generic Mission Planning and Scheduling
- focusSuite: Flight Dynamics for Satellite Operations
- hifly: Satellite Fleet Monitoring and Control
- magnet: Ground Station Monitoring and Control
- smart rings: Telecom Payload Reconfiguration
- smartHz: Telecom Capacity Optimization

GMV
INNOVATING SOLUTIONS

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