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POMPEII

GIVE IT A FUTURE

The Ministry for Cultural Heritage and Activities and Tourism (MiBACT) and Finmeccanica have sealed an agreement whereby the Group will donate innovative technologies and services for monitoring and protecting the archaeological site of Pompeii.

Through its companies, Selex ES and Telespazio, Finmeccanica is contributing its technological know-how free of charge, to those responsible for the protection and enhancement of one of the world's most famous and fragile archaeological sites. Finmeccanica's commitment provides evidence of the Group's desire to give prominence and importance to the restoration of cultural treasures of particular interest, while being totally in line with Finmeccanica's ongoing mission in the field of high technology.

The decision to focus on Pompeii derives, on the one hand, from the urgent nature of the challenges facing the site, and on other hand from the desire to restore to the Campania region - where the Finmeccanica Group employs over 6,000 people in the various controlled companies operating in this area - some of the technological research in which the Group heavily invests.

This agreement has seen the active involvement, not only of Selex ES and Telespazio, but also of all the institutional bodies concerned (MiBACT, the Great Pompeii Project, the Special Superintendence for the Archaeological Heritage of Pompeii, Herculaneum and Stabiae, Directorate-General for Antiquities) in an open exchange of ideas within a process of productive collaboration.

Finmeccanica is Italy's main industrial group, leader in the high technology field, and ranks among the top ten groups at world level in the Aerospace, Defence and Security sectors. Listed on the Milan Stock Exchange (FNC IM; SIFI.MI), with revenues of approximately 17 billion Euro, around 64,000 employees, 150 operating and commercial locations and 345 production facilities in 50 different countries world-wide, Finmeccanica is an international and multicultural group with an important presence in its four domestic markets: Italy, United Kingdom, the United States and Poland. Finmeccanica's success is based on its technological excellence, which springs from conspicuous investments in Research & Development (amounting to 12% of the revenues), and the constant efforts it makes to develop and integrate the skills, know-how and values of its operating companies. Finmeccanica is active in the following sectors: Helicopters (AgustaWestland), Defence Electronics and Security (Selex ES, DRS) and Aeronautics (Alenia Aermacchi) – which represent its core business – and it is also well positioned in the sectors of Space (Telespazio, Thales Alenia Space), Defence Systems (Oto Melara, WASS, MBDA), and Transportation (Ansaldo STS, AnsaldoBreda, BredaMenarinibus).

SUMMARY OF THE SOLUTIONS FOR POMPEII

In support of those responsible for the protection and enhancement of the ruins of Pompeii, the Finmeccanica Group will donate to the said site the innovative services and technologies identified in the agreement signed with MiBACT. This agreement has seen the active involvement not only of Selex ES and Telespazio, but also of all the institutional bodies concerned (MiBACT, the Great Pompeii Project, the Special Superintendence for the Archaeological Heritage of Pompeii, Herculaneum and Stabiae, Directorate-General for Antiquities) in an open exchange of ideas within a process of productive collaboration.

The proposals are the result of a series of investigations commenced in December 2013.

To the purpose, a multidisciplinary team identified three main areas of priority:

- risks of hydrogeological instability
- operational management of the site
- constructions and structure diagnoses

Risks of hydrogeological instability

As a back-up to site stability control, Finmeccanica will supply site operators with innovative instruments which will display (also on mobile devices) the results of satellite interferometric monitoring and in-situ surveying carried out using a network of wireless sensors, designed to identify slow movements of terrains and structures. Finmeccanica will develop a complete system to cover the entire process ranging from data acquisition to the use of the information acquired, through a dedicated platform.

Telespazio's interferometric monitoring services provides data on the slow movement of terrains and constructions both on the whole site of Pompeii and in the surrounding areas (for a total coverage of approximately 10 km²), thus making it possible to analyse also the context surrounding the area of the ruins so that those in charge can plan preventive or emergency measures.

The service uses data provided by the Italian satellite constellation COSMO-SkyMed, controlled by the Italian Space Agency, equipped with synthetic-aperture radar sensors which can capture images of the Earth both by day and night and in all weather conditions. COSMO-SkyMed data is characterized by exceptionally high geometric ground resolution making it possible to perform regular monitoring of soil movements.

The service involves two stages: historical analysis of the trend in movements of the surveyed points over a period of approximately two years prior to the commencement of works and a monthly monitoring service for the three-year duration of the agreement. Since the technique implemented is based on satellite surveying, it makes it possible to monitor with extreme accuracy the slow movements of points located within the area under examination (estimated density over 10,000 points per km²).

A second series of data will be provided by "early warning" wireless networks set up by Selex ES which can give information in real time on specific areas of the site.

The overall service will be made available via the Internet, through the infrastructure provided by e-GEOS, and will therefore be accessible through a web browser. Access to the information will be controlled by a security profiling system. Users with right of access will be managed directly by MiBACT whose personnel will be trained on how to use the platform by Finmeccanica.

Smart supports for better site operation

This aspect covers the activation of a secure system for the interoperability of mobile radio communications for the archaeological site and implementation of collaborative apps available on the smartphones of predefined users (security officers, technical bodies, etc.).

The system allows the security officers, provided with radio equipment (both analogue and TETRA) to communicate in an integrated manner, ensuring maximum coordination in the execution of control and prevention activities within the site. The reference technology is TETRA supplied by Selex ES, specifically defined for security and territorial control applications. Professional radio equipment specifically designed for the purpose will be supplied.

The *Smart Apps* consist of a collaborative service for friend users (site operators, security officers) which, via a smartphone app, makes it possible to send alarms or messages for promptly reporting any anomalous situations or requesting immediate assistance (e.g. acts of vandalism/damage to structures, medical assistance or security service intervention).

Thanks to this application the user is pin-pointed in the archaeological site of Pompeii and his/her position, as well as the type of intervention requested, is immediately communicated to the operators in the control room who then activate the necessary measures involving the relevant competent organizations.

Construction and structure diagnoses

Finmeccanica, thanks to a Selex ES product, has given the representatives of the archaeological site the possibility of providing a remote sensing service on the ground using hyperspectral imaging instruments for acquiring images and spectral signatures of the different materials and chemical components present in those areas identified as critical or of interest by the experts and managers of the Pompeii site.

This instrument gives the bodies responsible for preserving artistic heritage not only those elements needed to perform diagnosis for planning appropriate interventions but also documentation with a high information content derived from the hyperspectral datum (pseudo-colour mapping and classification).

The collected data is subsequently processed and made available to MiBACT technicians for consultation and analyses and will make up a digital archive of the monitored structures.

The technological innovations offered, the non-invasive nature of the solutions adopted and the experience gained allow Finmeccanica to act as interlocutor for the institutions responsible for protecting cultural heritage on an international scale, using the indisputable cultural tradition of our country as leverage.

FINMECCANICA AND ITALY'S HISTORIC-ARTISTIC HERITAGE

Putting expertise and innovative technological solutions at the disposal of the community has always been one of Finmeccanica's distinctive traits. In the case of Pompeii, Finmeccanica has decided to give its support, free of charge, to those responsible for the protection and enhancement of one of the world's most fascinating, famous and fragile archaeological sites.

On the one hand, this decision derives from the urgent nature of the challenges faced by the site of Pompeii, while on the other from the desire to restore to the territory - in this case the region of Campania where a number of Finmeccanica companies have their production plants - some of the fruits of the technological research in which the Group heavily invests, while at the same time exploring new fields of application for products developed in the Aerospace, Defence and Security industry.

This is not the first time the Finmeccanica Group has become involved in protecting cultural property, by putting technologies of excellence - developed in its laboratories for advanced research in the field of Aerospace, Defence and Security - at the disposal of Italy's artistic heritage.

Restoration of the Riace bronzes (Bronzi di Riace)

These two bronze statues, found in the Ionian Sea off the coast of Calabria in 1972, underwent sophisticated restoration work in the early 1990s to remove the clay casting cores which had been left inside and were posing a threat to the preservation of the bronze shell.

On that occasion, Finmeccanica contributed the technological know-how of some of its own companies, Alenia, Ansaldo and Eltag Bailey, in the execution of certain specific interventions: creation of an IT database on ancient bronzes, redesigning of the anti-seismic platforms, creation of computerized models of the statues and development of the microclimate and security system.

Construction of the protective casket for the Shroud of Turin

After the fire in 1997 in the chapel by Guarini which stands outside Turin Cathedral and where the Shroud was kept, the urgent problem was posed of preserving and safeguarding the relic in a special casket with characteristics requiring state-of-the-art design and construction technologies. In 2000 Alenia Spazio (now Thales Alenia Space) put the expertise and technologies it had developed in the space sector at the project's disposal, creating a casket out of a single piece of light aerospace alloy and having the internal microclimate parameters monitored by a computerized system.

Diagnosis of the condition of the façade on the basilica of Santa Maria Novella in Florence

The marble façade on the Basilica of Santa Maria Novella, completed by Leon Battista Alberti, is one of the most important works in Florentine Renaissance art: an architectural gem which requires constant monitoring if it is to be preserved intact against the risks posed by the passing of time, the effects of pollution and the weather. In 2006 and 2007, during two campaigns to collect data on the condition of the façade, Finmeccanica provided an instrument which was the result of many years' experience accumulated by Selex ES in the sector dedicated to the electro-optical investigation of the territory: the SIM.GA camera which, thanks to hyperspectral imaging technology, can acquire information on the chemical-physical composition of different materials and substances found in the area under examination. The images thus acquired have made it possible to define, in a non-invasive manner, a precise map showing the areas of deterioration on the Basilica's marble façade.

Inspection of the underwater archaeological park of Baiae (Naples)

The underwater park of Baiae is a protected marine area in the Province of Naples, located off the coast to the north of the Gulf of Naples. It encloses the ruins of noble residences and baths dating back to Roman times which were built along the coast but subsided into the sea due to bradyseism phenomena which have always been a feature of the Phlegraean coastline. An historic-artistic heritage the conservation of which requires special technological expertise in the field of underwater operations. WASS, a company in the Finmeccanica Group which produces underwater defence systems, is taking part in the COMAS research project dedicated to identifying new materials, techniques and methods to preserve and restore marine sites in their natural environment. In particular, WASS is involved in the definition and realization of a demonstration model of a three-dimensional underwater camera, with optical and acoustic imaging, to enable close-up inspection of the submerged archaeological structures.



GENERAL INFORMATION

The Archaeological site of Pompeii

The surface area occupied by the ancient city of Pompeii covers approximately 66 hectares, approximately 45 of which have been excavated. 1,500 buildings (domus and monuments) have been uncovered. Figures highlight, even if only from a quantitative point of view, the huge commitment needed, in terms of economical and professional resources.

- **1,500 BUILDINGS**
- **2 MILLION m³ OF WALLS**
- **17.000 m² OF PAINTINGS**
- **20.000 m² OF PLASTERWORK**
- **12.000 m² OF FLOORINGS**
- **20.000 m² OF PROTECTIVE COVERINGS**

The scene presented is not just an extensive archaeological site, but a complex urban system, a whole ancient city visited by approximately 2.5 million tourists a year (2013 data). Time has given back to us a suffering city, one that was just recovering from the earthquake of 62 A.D. and destined to be buried a few years later by the eruption of Mount Vesuvius in 79 A.D. After seventeen centuries, during which the city lay buried and forgotten, excavation work carried out since the mid-1700s has to date uncovered two thirds of the settlement.

Several factors lie behind its deterioration: the progressive and unrelenting decay of the structures, sometimes due to restoration work carried out over the years (especially following World War II) using inadequate methods; erosion caused by exposure to the weather; weed growth, atmospheric pollution and anthropic erosion.

The Superintendence

Italian law no. 456 of 6 August **1981** decreed the foundation of the **Archaeological Superintendence of Pompeii**, following the 1981 earthquake, creating a territorial separation of the Vesuvian municipalities from the rest of the Province of Naples and from the National Archaeological Museum which, by will of the Bourbons, was designated to collect not only the Farnese collection, but also all the antiquities found in the ruins of Pompeii and Herculaneum.

Article 9 of Italian law no 352 of 8 October **1997** granted the Superintendence independent scientific, organizational, administrative and financial autonomy. The archaeological superintendent is supported by an administrative manager.

Presidential Decree no. 233 of 26 November **2007** set up the **Special Superintendence for the Archaeological Heritage of Naples and Pompeii**, which like the Poli Museali, was vested with budgetary autonomy. The territorial scope of its competence encompasses the whole Province of Naples and includes not only Pompeii, but also Herculaneum, the Vesuvian sites, the Phlegraean Fields area (with the sites of Cuma, Pozzuoli, Baiae), the city of Naples with the National Archaeological Museum, the Sorrento Coast, Ischia and Capri.



A few months after the Special Superintendence was established, a Decree of the President of the Council of Ministers dated 4 July **2008** declared the archaeological area of Pompeii to be in a state of emergency due to the hazardous conditions of the ruins and appointed a Special Commissioner who completed his activities on **31 July 2010**, after which date the Special Superintendence returned to its routine activities.

Since January 2014, the Special Superintendence for the Archaeological Heritage of Naples and Pompeii has been divided into two institutions, one covering Naples, the Phlegraean Fields area and Caserta and the other covering the Vesuvian Sites (Pompeii, Herculaneum and Stabiae, Oplontis and Boscoreale) and has become the **Special Superintendence for the Archaeological Heritage of Pompeii, Herculaneum and Stabiae**.

Ordinary funds

Each year the Superintendence dedicates some of its own resources to restoration and maintenance work on the archaeological heritage of the sites for which it is responsible.

Overall revenues are made up of:

- **98% OWN REVENUE (EARNINGS ON TICKET SALES, ROYALTIES AND CONCESSIONS) WITH THE REST COMING FROM STATE TRANSFERS**

Expenditure is divided as follows:

- **70% ON INTERVENTIONS ON THE ARCHAEOLOGICAL STRUCTURES (RESTORATION, STABILIZING, SYSTEMS ENGINEERING, ETC.)**
- **30% ON MISCELLANEOUS EXPENSES (ORDINARY MANAGEMENT, CLEANING SERVICES, ELECTRICITY, GARDEN MAINTENANCE ETC.)**

Of the numerous works carried out in Pompeii between 2011 and 2013, "Routine and Extraordinary Maintenance Works" for the archaeological area are registered, costing over 1,500,000 Euros, making it possible to stabilize over 100 points in the ancient city. Of the various interventions carried out in 2013, we should mention the works which have made it possible to reopen the *Casa degli Amorini Dorati* (House of the Golden Lovers) and the *Orto dei Fuggiaschi* (Garden of the Fugitives), two of the most famous places in the ancient city.

For 2014, the Ministry has accelerated the immediate assignment of a first tranche of funding for the sum of 2 million Euros for routine maintenance work. And for the Easter holiday period, three new *domus* are expected to be opened to the public: the *house of Marco Lucrezio Frontone*, the *house of Trittoleno* and the *house of Romulus and Remus*.

The ordinary resources also cover garden maintenance and cleaning expenditure.



Active facilities at the ruins

Three entrances:

- The *porta Marina* entrance, near the Circumvesuviana railway stop.
- The *piazza Esedra* entrance, near the motorway exit.
- The *piazza Anfiteatro* entrance, near the modern city.

The main services available to the public are:

- Tourist Information Office near *porta Marina* and *piazza Esedra* (4 languages)
- Audio-guide service (*porta Marina*)
- Bookshop
- Luggage room
- Tourist guide coordination
- Catering services within the ruins
- Public healthcare - first aid post
- At the Pompeii ruins a Carabinieri station is also active which carries out control activities in support of the Superintendence on a daily basis.

Visitors

Tourist flows to the site are very high. Pompeii is the second most visited site in Italy after the Colosseum - Roman Forum and Palatine circuit: there are approximately 2.5 million visitors a year, generating an average annual income of over 20,300,000 Euros.



HISTORY OF THE RUINS OF POMPEII

On Sunday we went to Pompeii again.

There have been many disasters in this world, but few which have given so much delight to posterity, and I have seldom seen anything so interesting.

The houses small and windowless but their rooms, passages and arcades are gaily painted.

The city gate and the avenue of tombs are unusual.

There is one tomb of a priestess, shaped like a semicircular bench and with an inscription carved in large letters on its stone back.

As I looked over it, I saw the sun setting into the sea.

A wonderful place, worthy of peaceful thoughts.

Johann Wolfgang von Goethe (1749 – 1832) - "Italian Journey", 1816.

Excavation work began in 1748, during the reign of Charles of Bourbon, King of the Two Sicilies, with the main aim of increasing the kingdom's prestige. It proceeded in a discontinuous manner in different areas of the site, with no real systematic plan, and it was only after several years that the ruins were identified as Pompeii. It was in this way that part of the necropolis outside *porta Ercolano* (the *Herculaneum Gate*) was discovered, as well as the *temple of Iside* and part of the theatre district.

The period of French occupation, early in the 19th century, brought new impetus to the excavations, that then died out with the return of the Bourbons. The zones of the amphitheatre and forum were excavated, as well as *porta Ercolano* and the theatres. The discovery of the *casa del Fauno* (*House of the Faun*), with its enormous mosaic depicting the *Battle of Alexander*, aroused great interest.

After Italy achieved unity, and Giuseppe Fiorelli was appointed to direct the excavations (1861) there was a change in the method of work. Attempts were made to connect the districts that had already been brought to light, and then proceed systematically, keeping more detailed records of the excavations and leaving the paintings in place (previously they had

been removed and taken to the museum in Naples). The method of making plaster casts was also introduced, and this made it possible to recover the image of the victims of the eruption. At the beginning of the 20th century, the exploration was extended, along the lines marked by the roads, toward the eastern part of the city, also paying more attention to the traces left by the upper floors of the houses. A long period of fruitful activity followed (1924 - 1961) under the direction of Amedeo Maiuri.

In addition to the discovery of prestigious buildings (like the *villa dei Misteri* – *Villa of Mysteries*) the archaeologists completed the delimitation of the city, excavated large parts of regions I and II and the necropolis at *porta Nocera* (the *Nocera Gate*), and began a methodical exploration of the layers underlying the level of 79 A.D., in search of the older epochs of Pompeii.

In recent decades excavation work has gradually been scaled down with priority being given to restoring, maintaining and stabilizing those buildings which have already been uncovered. Activities which have gained new momentum thanks to the *Great Pompeii Project* currently underway.