



**CATALOGUE 2022 (Eng)**



**Cegelec**  
Défense



**CEGELEC Défense** is part of the Vinci Energies Group. The company is driven by performance-based objectives and aims to build long-lasting relationships with its customers and partners.

Globalization is a main driver for disruptive and fast pace evolutions within a shrinking time-frame ; customers are increasingly on the lookout for innovative, expert, collaborative solutions to mitigate major challenges. In an era of uncertainty and the rise of unprecedented threats and environmental challenges the demand for increased resilience of critical activities and utilities is a vital and strategic objective.

As a European leader in technological services, **CEGELEC Défense** has been providing its expertise in integrating solutions and systems for major Defence and Security Protection and Security projects for over fifty years.

**CEGELEC Défense** provides civil and military customers the required protection of facilities and networks as well as support commodities for crisis management and forces deployments.

Gilles LABORDE

## ABOUT US

CEGELEC Défense is a Subsidiary of Vinci Energies, one of the three divisions of VINCI Group contracting branch.

Based in Toulouse (France) CEGELEC Défense operates six Business Units with a common development strategy, the same edge expertise and appreciation of confidentiality as regards Defence and Security activities. CEGELEC Défense keeps abreast of competitors through lessons learned from solutions fielded with Armed and Security Forces and through integration of technological innovations while permanently networking both in and out VINCI Group (clusters, industrial consortia, etc.).

## CEGELEC Défense **Solutions & Services**

In charge of designing and manufacturing support solutions to be deployed in response to operational crisis (shelters). The Business Unit also conducts studies and acts as the prime contractor for projects involving the integration of industrial equipment, and the maintenance of the equipment in operational condition :

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## CEGELEC Défense **Protection & Sécurité**

Expert in the protection of critical and strategic infrastructure :

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## CEGELEC Défense **Infrastructures & Réseaux**

Whether acting directly as the prime contractor or in partnership with another prime contractor, CEGELEC Défense Infrastructures & Réseaux designs and produces complex, hardened infrastructures to house strategic communication and transmission systems. In charge of designing and installing facilities on sites, as well as the related logistic support operations and Follow On Support :

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## CEGELEC Défense **ACC I&S**

Engineering and manufacture of aerial stabilization and tracking solutions

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# OPERATIONS & CRISIS C2 SUPPORT



**CEGELEC Défense** proposes innovative infrastructures for implementing autonomous deployable logistics resources :

- MOBILE OPERATIONAL COMMAND POSTS
- EMERGENCY OPERATION CENTRES
- CRISIS MANAGEMENT CENTRES



## COMPREHENSIVE, INTEGRAL SOLUTION

The solutions developed by CEGELEC Défense pay particular attention to human requirements, without neglecting the actual system.

They consist of modular expandable shelters or containers to ensure operations are managed in the best conditions, in terms of responsiveness, performance and quality.

Thanks to the modular nature of the shelters, a fully-integrated command post can be laid out by adding different modules comprising the specific functions devoted to planning, operations management, communications, IT resources, logistics, intelligence and the management of back-up resources and support.

These « all-in-one » systems are designed to favour agility, improve Command & Control efficiency and reduce energy use.

Resources developed by CEGELEC Défense for :

- **The forward command post for the French Air Force (SCCOA),**
- **The level-2 command components of French NATO Quick Reaction Force,**
- **The Mobile Emergency Operation Centre for the French Gendarmerie Nationale.**

Armed forces  
operations

Catastrophes  
Natural disasters

Public unrest  
acts of terror

Health  
hazard

## OPERATIONAL REQUIREMENTS

Enable civil or military command centres to rapidly and autonomously deploy decision-making, communication and planning centres, whatever the conditions, allowing them to organise and manage large-scale operations in emergency situations:

- Planning
- Operations command and control
- Information and communication systems
- Logistics

# GENERAL CHARACTERISTICS



- Transportability: Air - Land - Sea,
- Adaptability to the terrain: slants and slopes up to 5%,
- Environment :
  - extreme weather conditions (-20°C to +70°C) tested in field situations,
  - threats, contaminated atmospheres (biological and chemical - BC).
- Operability: shelter delivered by flat-bed truck and rolled out manually using integrated handling mechanisms,
- Logistics : integrated or associated generator and airconditioning.

## INTERIOR FITTINGS

Integrated communication resources and networks (PABX, switches, router, T2, X25, ISDN, STN links, multi- and singlemode fibre optics, VHF/UHF) :

- Furniture (modular partitions, tables, shelves, chairs, etc.),
- Integrated power distribution (up to 40 sockets in a 6-unit shelter),
- BC protection for 15 people,
- Integrated communication-signal distribution: (up to 60 connection sockets for telephones, networks, video, radio),
- Integrated or external reversible air-conditioning systems (16 or 30kW cooling power).

## EXTERIOR FITTINGS

- Connecting corridors to link the shelters,
- Air-lift fixing points,
- Sun-shield nets and compatibility with camouflage nets,
- Roof-top ladder and life-line cable,
- Compatibility with handling and lifting equipment.

## OPERATIONAL CAPACITY

Tested in the field in the harshest environments: Sahel Saharan Band (MALI, NIGER, CHAD), Afghanistan, Congo, North Africa Middle-East (NAME).

## INTEROPERABILITY

Tested and approved in coalition military exercises and security operations :

- NATO QRF
- G20, G8 summits
- Combined response...

## HIGH DEGREE OF MODULARITY

Ultra-fast deployment (Maximum 1 hour with 4 people for the 90m<sup>2</sup> version).

Highly modular layout for use in a wide variety of deployment according to the number of units.

Nb cellules	Surface utile (m <sup>2</sup> )
7	89
6	78
5	67
4	56
3	45



# EXPEDITIONARY LOGISTICS



**CEGELEC Défense Solutions & Services** specialises in manufacturing deployable mobile pre-equipped structures, technical shelters, mobile water-purification stations and utilities. Thanks to the design and manufacturing expertise, as well as the experience of technical support in the industrial sector, CEGELEC Défense provide customers with adapted solutions and maintenance services.

- **EXPEDITIONARY CAMPS**
- **LOGISTICS & SUPPORT FUNCTIONS**
- **INFORMATION AND COMMUNICATION SYSTEMS**



## RELIABLE AND COMFORTABLE MILITARY EXPEDITIONARY CAMPS

Designed to the highest standards in order to ensure logistics agility and easy air-transport, the base-camp modules are developed to foster autonomy and resilience during operations and severe environmental conditions.



CEGELEC Défense expeditionary camps can be easily deployed in the field of operations by air, land or sea and require very little preparatory infrastructure work. All temporary structures are completely modular and scalable. They offer a high level of comfort and numerous technical features, which are particularly appreciated in harsh environments, while requiring little maintenance and upkeep.

## COMPREHENSIVE, INTEGRAL SOLUTIONS

Cegelec develops modular structures for special purposes (toilets, showers, kitchens, etc.) in order to provide all the essential expeditionary camp components.

These solutions are regularly used in civil defence and military operations and have proven their reliability and efficiency. They can be used in the most extreme climates and conditions, such as Arctic or Saharan environments.

## CHALLENGES

Deploying armed forces requires the rapid installation of canvas or rigid accommodation structures, whether temporary or permanent, which are perfectly suited for transit operations, mobile work sites or expeditionary operations living quarters.

# EXPEDITIONARY CAMP INSTALLATION AND MANAGEMENT SOLUTIONS

Our specific living-quarter solutions are designed to maintain the soldiers' combat capability by fulfilling their basic needs, whatever the weather, terrain and circumstances.

To achieve this, CEGELEC Défense Solutions & Services can provide a deployable solution comprising all the various modules required in a base camp:

- Command post,
- Medical unit,
- Power, water purification, etc.
- Accommodation for personnel,
- Armoury,
- Munitions store,
- Kitchen,
- Canteen,
- Storage of foodstuffs at controlled temperature or in dry condition,
- Toilet blocks,
- Laundry unit,
- Etc.



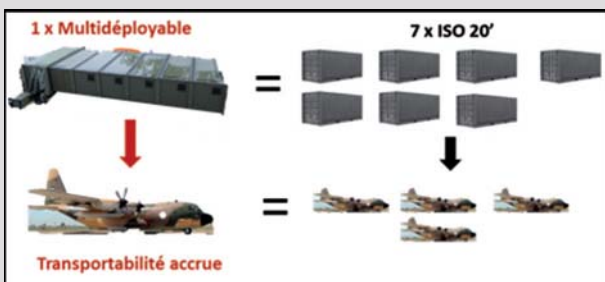
Creating an expeditionary camp also often involves deploying Command and Information systems.

The expertise of CEGELEC Défense Solutions & Services has made it possible to develop a « SAIO – Shelter All In One » datacenter, offering a high capacity for servers, data storage or network routers.

This solution can be integrated in a distributed cloud type architecture or operated independently..

## SHELTERS DEPLOYED

- 20-foot ISO shelter.
- Deployable shelter in modules of 2 to 7 units guaranteeing from 30 to 90 m<sup>2</sup> of usable surface area while significantly reducing the logistics resources required for transport to the site.
- Additional canvas structures.



## TECHNICAL FEATURES

Our pre-equipped shelters are easy to connect to all key utilities (electricity, air-conditioning, water, etc.).

Specific features can be added such as ballistic protection, surveillance cameras, access control system (for personnel and equipment), protected communications network, etc.



# CBRN<sup>e</sup>



Chemical, biological, radiological and nuclear risks represent a high-level threat. They primarily concern the use of chemical weapons (terrorism), industrial accidents, natural or environmental catastrophes, natural or induced viral pandemics.

**CEGELEC Défense Solutions & Services**, in association with leading French industrial companies belonging to the NBC Defence Economic Interest Group (GIE) has developed a comprehensive set of solutions, such as mobile mass casualties decontamination units, analysis and detection laboratories as well as collective protection shelters adapted to the type of risk :

- **CHEMICAL**
- **BIOLOGICAL**
- **RADIOLOGICAL**
- **NUCLEAR**



## COMPREHENSIVE, INTEGRAL SOLUTIONS

The modular nature of the pressurised chambers and shelters makes it possible to install them quickly in total autonomy, with no external infrastructures or resources needed.

Combined with its partners' offers, CEGELEC Défense provides solutions contributing to CBRN defence requirements :



- Detection, identification, alarm and monitoring,
- Individual and collective protection,
- Medical assistance,
- Decontamination,
- Waste and effluents.

## OPERATIONAL NEEDS

Providing professionals (soldiers, fire-fighters, security services, police officers, industrial companies, emergency services, local authorities) with mobile solutions for detection, decontamination and protection in order to anticipate CBRN threats :

- Dissemination of CBRN agents,
- Detection of a device or terrorists ready to disseminate CBRN agents,
- Contamination of the population or the environment (air, water, food, etc.),
- Contamination or infection of the population and consumables (water, food, health-care products, etc.).



# GENERAL CHARACTERISTICS

The solutions provided by CEGELEC Défense Solutions & Service are based on development programmes initially implemented to meet the needs of the French armed and security forces.

They are perfectly suited to civil defence and military operations , notably in response to terrorist attacks against the population :

- Chemical detection and radiological sensors to monitor an exterior security zone,
- Quick and easy deployment outside the contaminated area,
- Filtering and positive or negative pressurisation of protected zones.

These “all-in-one” systems are designed to favour agility and reduce energy use. They come with one or more additional Utility modules to supply power and other utilities, and to treat air or liquid/solid waste, etc.

- Transportability: Air - Land - Sea,
- Extreme weather conditions (-20°C to +70°C) tested in field situations in Afghanistan,
- Operability: shelter delivered by flat-bed truck and rolled out manually using integrated handling mechanisms.

## DECONTAMINATION MODULE



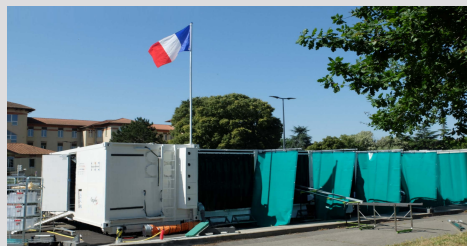
The decontamination unit housed in a 20ft rapid expansion shelter (7-in-1) is specifically designed for mass-casualties decontamination. The mobile decontamination unit offers eight treatment corridors with showers. It enables continuous decontamination of valid patients as well as victims on stretchers. High output capacity >150 patients /hr. Collection of waste water for retreatment (optional). The MDU is transported as a single 20ft ISO container on a truck with self deployment hydraulic hooklift.

## MOBILE CBRN ANALYSIS LABORATORY

The laboratory is enclosed in an ISO 20, 30 or 40-foot container, which is perfectly compatible with any means of road or air transportation.

It incorporates all the measuring and handling equipment needed to enable operators to collect, analyse and qualify chemical, biological or radiological contaminants in total safety, whether they be solid, liquid or in aerosol form.

It includes all the filtering and pressurisation equipment needed, as well as communication and alert systems.



## COLPRO MC2P - SAMD

COLLECTIVE PROTECTION SHELTER

The COLPRO version uses airlocks to provide access between the decontamination zone and a rest and waiting area. Patients are thus sheltered from all external contamination and can wait in safety for rescue services to arrive.

occupants are kept in a safe environment while they wait to be extracted from contaminated zones. The basic structure consists of a 20-foot container (that can be extended to provide a surface area up to 80m<sup>2</sup>), easily transportable in hostile environment.



# SPALAX - NG

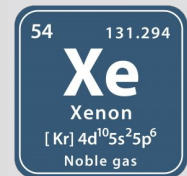
## Radio Xenon Detection and Analysis



The automated in-line Xenon sampling and analysis system (SPALAX-NG) participates into the international surveillance network for the implementation of the comprehensive nuclear test ban treaty (CTBTO)

Operation :

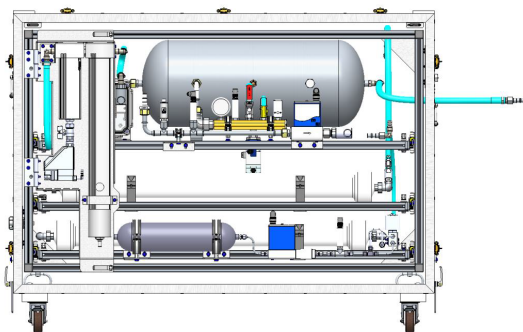
- **Air Sampling**
- **Rejection by permeation of H<sub>2</sub>O, O<sub>2</sub>, CO<sub>2</sub> by N<sub>2</sub> generating membrane**
- **XE Concentration by selective adsorption-desorption**
- **Detection of Xe isotopes by spectrometry and  $\beta / \gamma$  coincidence**



preparatory commission for the  
comprehensive nuclear-test-ban  
treaty organization

## Containerized or Modular **SOLUTION**

Integration of modules into one ISO 20ft container or  
into 5 cabinets with quick coupling connectors :



- Concentration
- Interface/Automat
- Purification
- Sampling
- Detection





## MEDICAL SUPPORT

**CEGELEC Défense Solutions & Services** designs and produces a wide range of medical commodities, ranging from simple first-aid stations to field hospitals and additional support utilities.

- **MOBILE HOSPITALS**
- **FIRST AID STATIONS**
- **EMERGENCY OPERATION CENTERS**



## OPERATIONAL NEEDS

CEGELEC Défense experience ensures that cutting-edge expertise is used to draw up our design and lay-out proposals and when defining the details of the technical and medical equipment to be included.

The solutions make it possible to implement medical support structures, from forward medical posts to surgical units and NATO Role-2 or Role-3 mobile hospitals.

Our medical facilities can be used in any environment, to support expeditionary operations in crisis situations, for humanitarian Aid operations in response to disasters or to support local populations and reinforce existing infrastructures.

## COMPREHENSIVE, INTEGRAL SOLUTIONS

Designed to contain logistics, storage and transport constraints, our deployable, modular shelters can be supplemented with tents to reduce costs.

The deployable shelters are like ISO 20' shelters when they are folded , thereby enabling them to be transported by road, air or sea.

## SPECIFIC MEDICAL MODULES & NON SPÉCIFIC MODULES



- Operating Theatre: 3-in-1 SAMD deployable shelter  
7 units or less,
- Intensive care: 3-in-1 deployable shelter,
- Dental surgery: 3-in-1 deployable shelter,
- CT Scanner: 3-in-1 deployable shelter,
- Sterilisation unit: ISO 20' shelter,
- Laboratory: ISO 20' shelter,

- Blood bank: ISO 20' shelter,
- Pharmacy: ISO 20' shelter,
- Morgue: ISO 20' shelter,
- Ward room: Tent or 7-in-1 shelter,
- Hygiene: ISO 20' shelter,
- Chapel: Tent or 7-in-1 shelter,
- Water treatment unit: ISO 20' shelter,
- Generator: ISO 20' shelter.

## EXAMPLES OF CONFIGURATION



TYPE OF MODULE	35-BED HOSPITAL	100-BED HOSPITAL
3-in-1 deployable shelter	3	5
ISO 20' containers	7	20
7-in-1 deployable shelter	10	18



NUMBER OF UNITS FOR :	35-BED HOSPITAL	100-BED HOSPITAL
Flat-bed truck	12	20
Trailer	11	18



INSTALLATION	35-BED HOSPITAL	100-BED HOSPITAL
Initial operational capability	24 h	2 days
Full operational capability	50 h	4 days



**CEGELEC Défense Solutions & Services** designs and produces mobile water purification units with a production capacity of between 40 and 400m<sup>3</sup>/day, and maintains the facilities in operational condition.

- DRINKING WATER
- WASTE WATER
- TREATMENT OF SLUDGE



Ultrafiltration



Osmose inverse

## DRINKING WATER PRODUCTION

The technologies in our treatment units use membranes, allowing us to create compact, modular systems :

- Microfiltration,
- Ultrafiltration,
- Reverse osmosis.

These different types of membrane processes are implemented according to the quality of the water resource :

- Fresh water,
- Salt water,
- Chemically or biologically polluted water.

## WASTE WATER AND SLUDGE PROCESSINGS

Waste water units integrating sludge dewatering are of modular design :

- Main component integrated in a 20 feet open top container,
- Standard unit capacity sized for 200 population equivalent.

Proposed processes include biologic treatment for waste water and mechanical filtering for sludge dewatering.

Main advantages :

- Rapid operation,
- Easy management with on screen monitoring of main parameters,
- Provision of simple, robust and maintenance friendly equipment.

## OPERATIONAL REQUIREMENTS

Production of large volumes of drinking water, in total autonomy and in any conditions. The units need to be transportable by road but also by rail and sea.

The Comprehensive, integrated solutions are specifically suited for :

- The French Armed Forces expeditionary operations,
- Civil defence or NGO operations during natural catastrophes (earthquakes, floods),
- Humanitarian operations,
- Expeditionary base camps,
- Field hospitals.

## SMTE MOBILE WATER PURIFICATION UNIT



**Input water supply :** Fresh water (surface or underground water)

**Output yield :** 40 m<sup>3</sup> / d

**Architecture :**

- 2 x processing boxes (1 m<sup>3</sup> each),
- 1 x storage box.

## MOBILE FOUNTAIN



**Input water supply :** Fresh water (surface or underground water).

**Output yield :** 70 m<sup>3</sup> / d

**Architecture :** Integration on light flatbed truck.

## WTU 400 WATER TREATMENT UNIT



**Input water supply :**

- Brackish or salt water (surface or underground water),
- Chemically polluted water (cf specifications).

**Output yield :**

- 400 m<sup>3</sup> / d using ultrafiltration,
- 150 m<sup>3</sup> / d using reverse osmosis.

**Architecture :**

- 3 x containers ISO 20' processing,
- 1 x containers ISO 20' storage.

## SLPEP LIGHT WATER PURIFICATION UNIT



**Input water supply :**

- Brackish or salt water,
- Fresh water (surface or underground water),
- Chemically or biologically polluted water (cf specifications)

**Treatment capacity :** 200 Population Equivalent.

**Output yield :** 9 m<sup>3</sup> / d.

**Architecture :**

- Reverse osmosis process,
- Integrated on truck.

## WASTE WATER TREATMENT UNIT



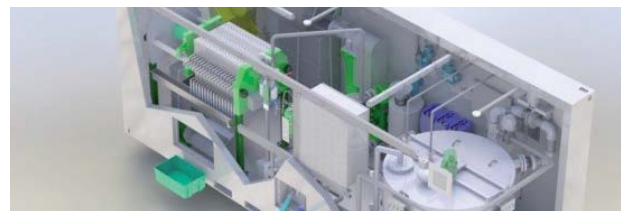
**Treated raw water :** Urban waste water.

**Treatment capacity :** 200 Population Equivalent.

**Architecture :**

- Biological process (activated sludge),
- Taux d'abattement :  
75% BOD, 75% O<sub>2</sub>a, 75% MES.

## SLUGE DEWATERING SYSTEM



**Type of sludge treated :**

- Sludge from biological sewage plant.

**Treatment capacity :** 40 kg Dry matter / d.

**Architecture :**

- Container 20 ft « Connect ready »,
- Process = Press Filter,
- Setup time < 1 hr / 2 operators.

## CUSTOM DEVELOPMENTS

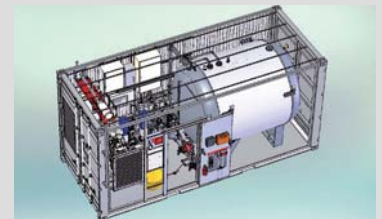


**CEGELEC Défense Solutions & Services** masters all the operational constraints and standards related to military equipment requirements and design .

CEGELEC Défense has acquired an extensive expertise and experience in the field of nuclear, biological, EMC and EMP protection, and in the hardening of specific systems for mobile use.

The company works hand in hand with its customers from the pre-project phase to the actual production and fielding of the systems :

- **REQUIREMENTS ANALYSIS**
- **TECHNICAL JUSTIFICATION**
- **DESIGN OF CUSTOM-MADE STRUCTURE**
- **INTEGRATION OF SYSTEMS AND PROCESSES**
- **PROJECT MANAGEMENT AND PLANNING**



## TOOLS SUITABLE FOR THE STUDY AND PRODUCTION REQUIREMENTS

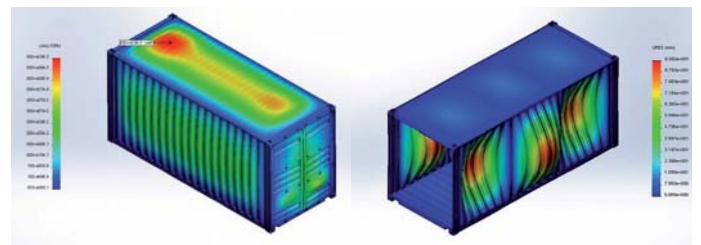
CEGELEC Défense is equipped with all the requisite tools, ranging from computer-aided design (CAD) to the finite element calculation module, and develops the products so as to optimise each system in the following areas :

- Thermal insulation,
- Vibration,
- Mechanical resistance,
- Electrical engineering,
- HVAC engineering.

All these tools enable CEGELEC Défense to produce the technical specification files that meet customers' stringent requirements.

The use of CAD software in the workshops enables the technicians to better understand how the system is assembled.

Enterprise Product Data Management (EPDM) allows our teams to manage the configuration of systems and to track products in a given series.



## CHALLENGES

Propose solutions tailored to the specific needs of our customers while respecting all the constraints related to operational theatres or deployment sites.



## DESIGN OFFICE AUDITS

The company is regularly audited by AFAQ or AFNOR during annual follow-up audits or for ISO 9001, ISO 14001 and OHSAS 18001 certifications; no non-compliance has ever been detected. The teams from the Design Office at CEGELEC Défense are acknowledged for their professionalism and the quality of their work.

## QUALIFICATION SYSTEM

Our entire organization is certified by AFAQ; during the development of a system, this allows us to undergo state certified qualifications to demonstrate that our systems comply with the requirements initially expressed, on a step-by-step basis.

## SOFTWARE USED

### Mechanical specification

- SolidWorks.

### Electrical specification

- SolidWorks Electrical,
- See Electrical.

### Electrical sizing

- Elec Calc,
- Caneco.

### Mechanical sizing

- Solid Works simulation Pro.

### Other

- EPDM.

## REFERENCES





## FOLLOW-ON SUPPORT



**CEGELEC Défense Solutions et Services** provides turnkey integration and mechanical and electrical maintenance services for the systems developed.

Due to the wide variety of projects carried out, our operational teams have a broad range of technical skills and specific understanding of operations, which multi-disciplinary maintenance companies cannot compete with.

- **OPTIMUM TECHNICAL EXPERTISE**
- **ONE-OFF OR REGULAR SERVICE VISITS**
- **MAINTENANCE ENGINEERING**

## THE FOUNDING PRINCIPLES OF CEGELEC DÉFENSE MAINTENANCE AND MOC OFFER

*« Maintaining a system or facility involves deciding on the means to prevent, correct, improve and operate the system or facility in the best operating conditions according to their use and budgetary constraints in order to optimize the total cost of ownership ».*

Maintaining a system or facility in operational condition requires rigorous operating methods and procedures. This is a key factor as regards the organization of the service, guaranteeing that our technicians fully master the technical requirements.

CEGELEC Défense Solutions and Services offers multi-year service contracts with an obligation to achieve results, or can conduct occasional operations.

The technicians at CEGELEC Défense Solutions and Services have the highest levels of certification and do more than simply ensure the maintenance plan is rigorously applied.

They continually propose ideas and improvements to increase the reliability and maintainability of the technical facilities they are responsible for.

The technical teams and management at CEGELEC Défense Solutions and Services involved in Maintaining facilities in Operating Condition (MOC services) are constantly liaising about the roll-out of operations thanks to periodic internal review meetings. Consequently, they play an integral role in drawing up the maintenance policy, maintenance plans, procedures and associated operations-sheets established in agreement with the customer.



## MAINTENANCE ENGINEERING

Our technicians use tried-and-tested methods and tools provided by the engineering, methods and training departments. The training department provides operational teams with support as regards the following activities :

- Preparation, launch and management phases of contracts,
- Drafting maintenance operation sheets and operating procedures,
- Creating maintenance plans, equipment lists,
- Defining and implementing performance indicators, maintenance reports and improvement plans,
- Actions aimed at improving reliability, studies and analyses of defects (MTBF, FMECA, etc.),
- Implementation of equipment for monitoring facilities and thermal analyses (condition-based maintenance),
- Definition, management and optimisation of spare parts stocks,
- Implementation and operation of CAMM (Computer Assisted Maintenance Management),
- Integrated Logistics Support,
- Configuration and obsolescence management,
- Technical and regulatory watch.

### MAINTENANCE LEVELS 1 TO 4

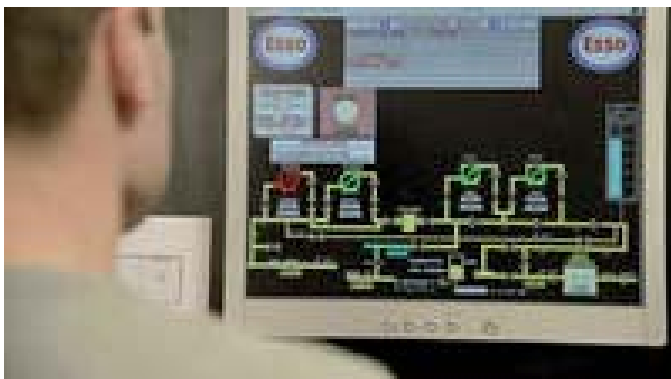


- Technical scope : mechanical, electromechanical, high and lowvoltage electrical currents, automation, etc.,
- Maintaining shelters in operational condition,
- Maintaining facilities (aimed at protecting the safety of individuals and property ) in operational condition,
- Overall maintenance of production or service sites.
- Maintenance of industrial facilities.

### MAINTENANCE LEVEL 5 AND MHO



- Systems upgrades, specific installations, specific tools,
- MHO works, transfer of industrial machines and equipment,
- Ensuring compliance as regards the safety of property and persons (fire detection, access at height, electrical installations, access control, etc.).



## TECHNICAL SUPPORT

- Hotline H24/J7,
- On-call teams,
- Remote maintenance.

## DESIGN

- Hotline H24/J7,
- Electrical and mechanical Design Office,
- Project management,
- Training, consulting.

## REFERENCES



AIRBUS SAFRAN  
LAUNCHERS

THALES



# CLIMATE TEST CHAMBER



**CEGELEC Défense Solutions & Services** has a large-capacity climate chamber for testing and qualifying complete equipment sets.

- **CLIMATE CHAMBER**
- **RAIN TEST BENCH**
- **10-TONNE TRAVELLING GANTRY CRANE**

## QUALIFICATION OF STRUCTURES AND MOBILE EQUIPMENT

This test facility, combined with expertise acquired on «Defence» projects, enables us to provide complex test solutions for large-scale equipment, including when the equipment is in operation and/or in the presence of operators.

CEGELEC Défense Solutions & Services reproduces the climate conditions of different regions around the world in its chamber, in order to check the performance and compliance of structures and mobile facilities, and to qualify them.



## TECHNICAL DESCRIPTION

The dimensions of the climate chamber are as follows :

- Usable volume of 680m<sup>3</sup>, with a total volume of 840m<sup>3</sup>,
- Dimensions of usable surface area :  
W 11.5m x D 13.5m x H 4.60m,
- Dimensions of access door: W 4m x H 4.20m,
- Maximum load on ground: 40 tonnes.

The operating ranges and performances of the climate chamber are as follows :

- Temperature from -40°C to +70°C,
- Relative humidity: from 10 to 100% depending on the temperature,
- Maximum heat load: 30kW at -25°C.

The climate chamber can reproduce climate conditions according to civil and military reference systems (STANAG, GAMEG-13, MIL STD, ISO, etc.), in order to carry out :

- Qualification tests (storage, start-up, operating, etc.) in the cold, dry heat or humid heat,
- Customised tests.

## ASSOCIATED RESOURCES

To carry out its activities, Cegelec Défense Solutions & Services has an industrial construction workshop of about 5,000m<sup>2</sup>, with 24/7 security service and surveillance system in accordance with the standards of the DRSD (French Defense Intelligence Directorate). The workshop is equipped with various lifting systems used to handle the customers' equipment when it arrives at and leaves the workshop.

Its equipment includes :

- A light forklift truck: 1.5 tonnes,
- A heavy-duty forklift: 10 tonnes,
- A travelling gantry crane: 10 tonnes.

CEGELEC Défense Solutions & Services also has a rain test bench with an adjustable output to carry out tests in real conditions.

- Usable area covered by sprinklers :  
L 8.5m x W 7.2m x H 4.5m
- Adjustable output from 150mm/hour to 500mm/hour.



## REFERENCES



# CRITICAL INFRASTRUCTURE PROTECTION



**CEGELEC Défense Protection & Sécurité** is the acknowledged expert in ensuring the safety and security of critical infrastructure, notably strategic defense sites. This expertise draws on an extensive experience of security architecture for information systems (supervision and hypervision) and the use of the most advanced technologies in terms of perimeter protection and access control.

The company also has the capability to install facilities and equipment, to maintain the facilities in operating condition, to ensure their ongoing security, and to manage classified information. The company has a comprehensive offer covering :

- **PHYSICAL PROTECTION OF SITES**
- **ACCESS CONTROL**
- **INTRUSION DETECTION**
- **VIDEO-SURVEILLANCE**
- **OVERALL SITE INFORMATION SYSTEM**



## COMPLIANCE WITH CONFIDENTIALITY RULES

CEGELEC Défense Protection & Sécurité has the requisite certifications as well as the technical and organizational resources to manage classified information and documents up to « Top Secret » level.

The company is registered as a High-security Establishment (Etablissement à régime restrictif [ERR]) by French Ministerial decree dated 18 January 2012. The premises have a restricted access-control, managed by a dedicated security service.

All protected activities comply with the French cross ministries policy statement « IGI 1300 SGDN/PSE/SSD » of 30 November 2011.

## CHALLENGES

Securing a site implies establishing protection systems in accordance with the risks, by adjusting the human and technical resources to the organizational structure in order to achieve optimum performance in three key areas: Protection— Detection—Reaction. CEGELEC Défense Protection & Sécurité service offer includes the deployment of active and passive protection systems around the periphery of the sites, at critical points and buildings. The resources are sized to achieve the security objectives related to certification.

## SITES

### SECURITY



CEGELEC Défense Protection & Sécurité service offer meets the required constraints and standards for the physical protection of sites with intrusion-detection systems, with alarms to the command post or security post inside the site.

#### Physical protection (supplies, installation)

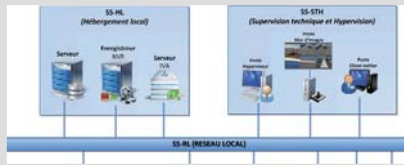
- Protection systems such as fences, fence overhang systems, barbed wire, anti battering-ram systems, barriers, bollards etc. to prevent vehicles or pedestrians from entering a site,
  - Work on roads and utilities.
- #### Electronic systems for detection and verification
- Intrusion-detection, access-control and video-surveillance systems.

#### Cyber-security

- Information systems that process, handle and store data.

## SSI

### INFORMATION SYSTEM SECURITY SUPPORT



CEGELEC Défense Protection & Sécurité has a specific unit dedicated to information system security (including industrial information systems). The unit operates on a cross-functional basis on projects or works on targeted project issues, supporting operations so as to provide services that meet our customers' needs in terms of information security.

- Audit,
- Analysis,
- Implementation,
- Verification,
- Certification support.

## SUPPORT FOR CRITICAL PROGRAMS

### INTEGRATED LOGISTICS SUPPORT/ MAINTAINING SYSTEMS IN OPERATING CONDITION/MAINTAINING SYSTEM



CEGELEC Défense Protection & Sécurité has an Integrated Logistics Support (ILS) unit, dedicated to Maintaining systems in Operating Condition (MOC) and ensuring system security. The unit's mission, organization and resources are optimized to meet the specific operational and secrecy-protection requirements of our customers.

- Ensure customer satisfaction,
- Achieve an operating level that guarantees optimum availability,
- Ensure the safety of personnel, whether operators or users,
- Train users.

## LAYOUT

### OF OPERATIONS CENTERS

Our NOC/SOC offer is based on a specific technical and organizational structure devoted to dealing with network and security issues :

- Formalizing the decision-making chain,
- Drafting management and operational processes,
- Identifying and separating NOC and SOC functions,
- Implementing management and automation tools.

## PROJECT

### MANAGEMENT

CEGELEC Défense Protection & Sécurité provides a comprehensive range of services covering every phase of the project life-cycle; our objective is to support customers through each step of their project :

- Solution engineering,
- Supervision: inspections, drafting of CRE (IS security) and validations,
- Ensuring IS Security: deploying hardware and adjusting security settings,
- Maintaining system security,
- Training.

# FIXED

## INFRASTRUCTURE



## MISSIONS

The Armed Forces must have secure communication and transmission systems.

Either directly fulfilling the role of prime contractor or in partnership with another prime contractor, **CEGELEC Défense Infrastructures & Réseaux** produces complex, reinforced infrastructures to house these communication and information systems.

## PROGRAMMES AND REFERENCE SYSTEMS

Communications networks for the French Navy :

- Design and production of low-voltage work-package for the French Marine Transmission Centres, including the monitoring of automatic control systems,
- Maintenance of power, air-conditioning, RF shielding systems.

Combined forces communications networks :

- Design and production of fully equipped Faraday cages, with reinforced air conditioning and power generators,
- Design and production of shelters with protective retaining walls and shelters placed under reinforced concrete casings,
- Maintenance of power and air-conditioning systems.

Communications networks for the French Army :

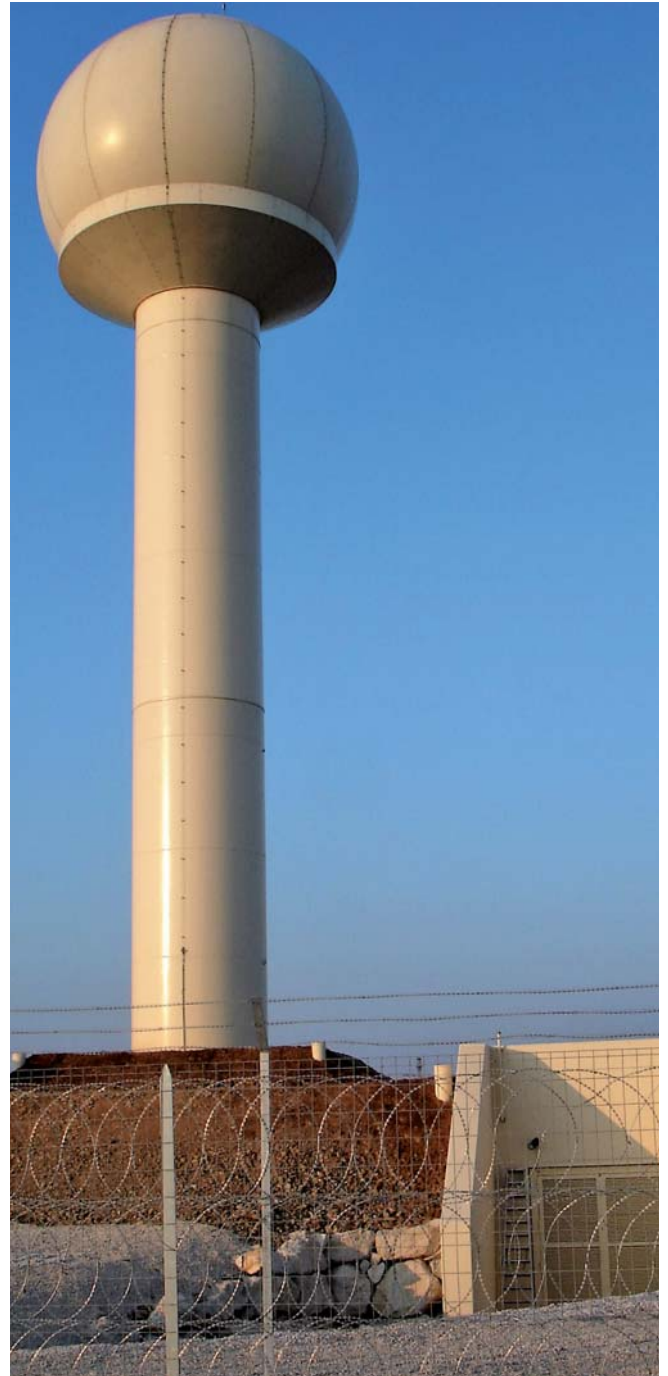
- Design and production of equipped Faraday cages from 50 to 1200m<sup>2</sup>,
- Maintenance of power and air-conditioning systems, and electromagnetic-protection.

Communications networks for the French Air Force :

- Design and production of networks with buses for implementing fiber optics, installation of communication equipment and data recording for air bases.

Satellite-based networks :

- Electrical, mechanical and climate studies, and outfitting of premises for transmission equipment.



# GENERAL CHARACTERISTICS



- Production of hardened «TEMPEST» shelters, including power generators and air-conditioning systems with BC protection,
- Free-standing Faraday cages with reinforced power generators and air-conditioning systems,
- Civil engineering and road and utilities works,
- Production of free-standing Faraday cages, with electromagnetic protection interfaces , including energy, signals, fluids and access points,
- Production and distribution of power and air conditioning,
- IT networks, fire protection,
- Fixtures and fittings relating to all trades and securing the premises,
- Maintenance of power, air-conditioning, electromagnetic -protection, lightning-protection, fire-protection systems,
- Active systems for lightning protection (storm detectors, switches with high isolation power).



## LIGHTNING PROTECTION OF ILS (INSTRUMENT LANDING SYSTEM)

- Supply and installation of automatic storm detection systems,
- Maintenance.

## MISCELLANEOUS

- Design,
- Implementation,
- Configuration and maintenance of secure videoconferencing and data-transmission systems.





# INFORMATION SYSTEM AND NETWORK PROTECTION



With its long-standing experience of projects involving the design of infrastructure aimed at housing communication systems for strategic command centres, **CEGELEC Défense Infrastructures & Réseaux** has a recognized expertise in the protection of information systems and networks (High Power Microwave, Electro Magnetic Pulse, hazards of Electro Magnetic Radiations or compromising electromagnetic signals).

## A COMPREHENSIVE APPROACH

Information system security involves ensuring the integrity, confidentiality and availability of the information in the system, as well as the non-repudiation of transactions and the authentication of users. To achieve this, a structured security process is required :

- Identification of threats and vulnerabilities,
- Assessment of the probabilities associated with each threat,
- Assessment of the consequences - Choice of counter-measure.

Deploying a security policy (all measures) requires a comprehensive approach to ensure the coherence between the resources to be used :

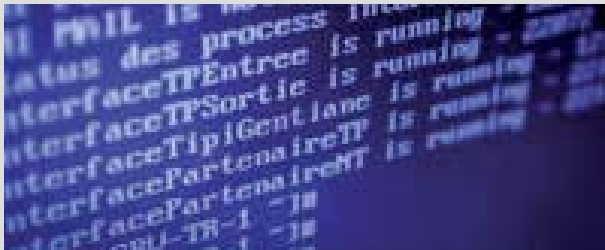
- Establishing organizational rules and operating procedures,
- Raising user awareness,
- Implementing technical measures.

CEGELEC Défense Infrastructures & Réseaux works hand in hand with its customers from the design to the deployment of systems, and maintains the security and operating condition of the systems deployed).



## SSI

INFORMATION SYSTEM SECURITY AND  
CYBER-SECURIT



Cegelec Défense has a specific unit devoted to information system security (including industrial information systems) and cyber-security. The unit operates on a cross-functional basis on projects, supporting operations so as to provide services that meet our customers' needs in terms of information security.

Cegelec Défense service offer addresses every phase of a project, in order to provide comprehensive support :

- Management: project management, coordination, drafting of plans, etc.
- Engineering : audit of the organisation, design of the solution, definition and drafting of technical security documents,
- Supervision : inspections, drafting of CRE (IS security) and validations,
- Production : adjusting the security parameters of Operating Systems and monitoring their deployment on site,
- Support : Maintaining the system's security, training and raising user awareness.

### Physical security :

- Choice of architecture and network equipment,
- Supervision and hypervision,
- Functional security (redundancy, etc.),
- Equipment infrastructures (Faraday chambers, etc.),
- Security of the premises (access control, anti-intrusion and fire-detection systems, etc.),
- Reinforced work stations,
- Installation rules (zone layout, etc.).

### IT security :

- Data,
- Applications,
- Operating systems,
- Encryption techniques,
- Partitioning between users, etc.

## TEMPEST

PROTECTION AGAINST COMPROMISING  
PARASITE SIGNALS



The aim of TEMPEST protection is to remove the risk of malicious operations caused by the propagation of parasite signals, whether by **conduction** or **radiation**. It involves strict measures as regards the choice and the implementation of the equipment.

Cegelec breaks the approach down into a series of processes aimed at reinforcing the system against threats.

For example :

### Use of Faraday cages

- Effectiveness of the shielding qualified in laboratory,
- Protection from radiation by NIDA and cut-off doors,
- Protection from conduction using filters,
- Wall duct via collector plate.

### Use of certified materials

- Protected operator stations, printers, scanners, etc.

### Installation rules, design of zone layout

- Compliance with coupling zones according to the category of equipment,
- Radio-electrical clarification in premises around coupling zones,
- Installation of protective accessories: copper plates and cowling, electrical filters on the edge of the zone, galvanic isolation,
- Massive use of fiber optics,
- Physical separation of cable ducts (red/black).



# HARDENED SHELTERS

**CEGELEC Défense Infrastructure & Réseaux** has long experience of projects involving the creation of **complex hardened infrastructures** aimed at housing communication systems for strategic command centres, as the company has participated in most of the major programmes undertaken by the French Ministry of the Armies over the last 50 years, dating back to the nuclear missile site on the Plateau d'Albion.

## STATE SOVEREIGN MISSION

Whether underground or half-buried, the shelters and relay stations housing the active and passive equipment of the command network play an important role: they provide the applications with a transmission medium that is permanently available, reinforced against High-Altitude EMP and protected against potential aggressions such as listening-in, intrusion, and explosions in the air or on the ground.

If the shelter is intended to receive personnel (command center), it must provide CBRN protection and survival requirements.

The extreme criticality of such an environment demands particularly strict requirements, based on appropriate solutions :

- Physical reinforcement (retaining wall, concrete casing, etc.) to resist against high-level attacks; anti-blast valves,
  - High-altitude EMP reinforcement: integration of utilities in a main Faraday cage, linked to a reinforced power generator,
  - Active lightning protection,
  - Reinforcement of CBRN protection filters and positive pressure,
  - Self-sufficiency : ability to survive thanks to long and short-term operational autonomy,
  - Protection against intrusions : fence and/or barbed wire with intrusion detection and cut-off system,
  - Fire detection and automatic extinction system,
  - Central technical management and utilities management, normal and emergency lighting,
  - Environment, adapting to the sites: layouts adapted to the configuration of sites, sizing of foundations and buildings based on soil studies and climate conditions.
- climatiques.



## FARADAY CAGES

As a central component for underground shelters or operational centers housed in an above-ground building, Faraday cages are vital to prevent systems being compromised, High-altitude EMP, COMSEC and TEMPEST protection.

As a system designer and manufacturer, CEGELEC Défense Infrastructures & Réseaux was commissioned by the CNES to design and produce a TEMPEST anechoic chamber; this was an unprecedented undertaking considering the cage's exceptional dimensions (L 30m x W 20m x H 18m) and the level of damping required.

CEGELEC Défense Infrastructures & Réseaux has provided the French Armed Forces with dozens of Faraday cages, and also provided the services to maintain the integrated equipment in operating condition :

- Power cabinets, uninterrupted power supply and rectifier bays,
- Cabinets for air-conditioning and air treatment,
- Fire protection and central technical management,
- Reinforced power generators,
- EMP Equipment: NIDAS, collecting plates, access air-locks, wave-blocking tubes, cut-off door, emergency door, etc.



## CROSS-DOMAIN EXPERTISE PROVIDING A COMPREHENSIVE OFFER



Because Cegelec aims to provide its customers with the very best solutions and services, the company has brought together and developed a broad spectrum of skills: civil engineering, mechanical engineering, power production and distribution, air conditioning, security, monitoring and control systems, computing, networks, etc.

These are essential assets for complex projects involving underground or semi-buried facilities. They enable Cegelec to propose a comprehensive offer :

- Prime contracting service,
- Design, calculations for structures (3D modelling),
- Production,
- Qualification, integration,
- Deployment,
- Maintaining in operational condition (MOC),
- Rehabilitation.

# INTEGRATED LOGISTIC SUPPORT

MAINTENANCE AND SECURITY FOLLOW-ON SUPPORT



**CEGELEC Défense Infrastructures & Réseaux** has an Integrated Logistics Support (ILS) unit, dedicated to Maintaining systems in Operating Condition (MOC) and ensuring system security. The unit's mission, organization and resources are optimized to meet the specific operational and security-protection requirements of its customers.

- **INTEGRATED LOGISTICS SUPPORT**
- **MAINTAINING A SYSTEM IN OPERATING CONDITION**
- **MAINTAINING SYSTEM SECURITY**

## SUPPORT FOR SENSITIVE PROGRAMMES

CEGELEC Défense Infrastructures & Réseaux provides both upstream services (sizing, preparing the validation of the support) and downstream services (maintaining the system in operating condition) as regards operating systems.

The services are à la carte and include the following :

### Management

- Call centre - technical hot-line ,
- Recording and tracking of technical incidents,
- Configuration management and tracking,
- CAMM (Computer Assisted Maintenance Management).

### Logistics support engineering

- Analysis of logistics support and technical optimization,
- Creation of logistics service tree structure,
- Drafting of ASL reports,
- Establishing the maintenance plan and/or training plan,
- Deploying the initial support including: training, documentation, supply of test and support equipment, supply of EMST , the supply of spare parts and consumables,
- Verifying that the support system operates correctly.

### Support work

- Recurrent and non-recurrent preventive maintenance operations,
- Corrective maintenance operations,
- Adaptive maintenance,
- Upgradable maintenance operations.

### Assistance

- Training and skills transfer,
- Technology watch,
- Obsolescence watch.

# MAINTAINING A SYSTEM IN OPERATING CONDITION

## Preventive maintenance

The objectives of preventive maintenance are :

- To reduce the risk of failures,
- To maintain the performance of the facilities,
- To limit down-time,
- To ensure the reliability of the facilities.

Preventive maintenance of the facilities is carried out systematically according to the operations-sheets established when drawing up the maintenance plan and according to the manufacturer's operations-sheets, based on a pre-defined schedule or when a problem is detected.

The monitoring of certain sensitive parts and technical equipment is reinforced by a joint agreement with the users in order to reduce the risk of breakdowns and thereby reduce the risk of malfunctions that may disturb users.

## MAINTAINING A SYSTEM'S SECURITY

These maintenance operations aim to maintain the system's initial security condition throughout its lifespan.

In the event that a new vulnerability is identified as regards one of the components in the system concerned, this service makes it possible to assess the risk level and then, depending on the risk level and in consultation with the Administration, to implement an organizational or technical workaround or a corrective measure within a certain time-frame.

Maintaining a system's security can be divided into two parts :

- The upstream part aimed at establishing and objectively ranking the risk-reduction measures,
- The down-stream part that involves implementing the measures decided upon.

## Curative maintenance

Should a defect in the equipment or facility occur, the aim of corrective maintenance in the event of a major failure is to :

- Take preservation measures,
- Limit the direct consequences on the system's role,
- And, at the same time, deal with the failure.

Repairs are followed by an analysis of the cause in order to prevent any further occurrences.

In the event of a minor failure, the aim is to locate and repair.

The expertise of the technicians from CEGELEC Défense Infrastructures & Réseaux unit makes it possible to carry out this analysis quickly and to remedy the problems.

CEGELEC Défense Infrastructures & Réseaux also ensures compliance with all procedures, notably as regards the triggering any intervention and updating documentation, if any changes or amendments must be made.

## DOCUMENT MANAGEMENT

All the documents containing information about the organization, work instructions or technical data, whether from internal or external sources, are subject to control measures to ensure that their content is valid, that the documents are distributed and that only relevant versions are used.

# ACCIS

## STABILIZATION & TRACKING

### Antennas and Platforms



**CEGELEC Defense ACCIS implements a strategic know-how in the design of antenna positioners, turrets and stabilized platforms or slewing systems. This expertise is complemented by a legacy expertise in test benches for the railway domain.**

- **ANTENNA POSITIONERS**
- **STABILIZED PLATFORMS**
- **TRACKING TURRETS**
- **ELECTRIC OR STREAMLINED MASTS**

Naval & Submarine	Land
Air & Space	Anechoic chambers

**Since 1980, CEGELEC DEFENSE has been designing and manufacturing telemetry systems and servo-controlled multi-axis systems for civilian and military applications. It complies with civil and military standards such as MIL-STD and STANAGs .**

#### Naval application

- Stabilized antenna
- Telemetry
- Satellite communication

#### Radome

- Transparency
- Beam deflection
- Modification of the radiation pattern (flash lobe)
- Measurement of a single or support mounted antenna (satellite, ...)
- Measurement of gain, radiation and polarization
- Calibration
- Characterization
- Radar Cross Section measurements
- Model (missile, plane, etc....)
- Full size objects (missile, lane, etc...)

#### Anechoic chamber:

- Near field: multi-element antenna or active antenna measurement
- Far field: antenna or other targets measurement
- External base for far field (over several kilometers)

#### Tractography :

- Tracking of flying objects
- Compact trackers for dishes up to 3 meters in diameter

#### Control electronics:

- Control of satellite receiving antennas
- Applications of measurement benches in free field or in anechoic chamber
- Trajectory applications

#### Civilian and military application:

- Radar
- Weapon systems



#### KEY DOMAINS

- Ground station
- Measurement and qualification
- Radar
- Data transmission
- Naval applications
- Control electronics
- Trajectory
- Electro-optics

## 2 axis servo turrets

- Application of signal transmission in satellite tracking (stationary - geostationary - scrolling)
- Capacity from 1 to 13 meters dishes

## Measurement and Qualification of heavy or light single or multi-axis servo-controlled positioners

- Servo-controlled polarization head
- Single or 2-axis mast and head
- Source positioner

## Applications

- Qualification tests in anechoic chamber
- Antenna patterns
- Radar Cross Section measurement
- Near or far fields
- Material characterization bench

## Data Transmission

Small and 2-axis turrets & 1-axis servo positioner

- Antenna positioning
- Object tracking
- Video or radar monitoring
- Data transmission and reception
- Laser positioning

## Location

- Telescopic mast, fixed station, land vehicle, ship, aircraft



## STABILIZED TURRETS AND PLATFORMS

### Description

- Precision drive mechanisms with automatic backlash compensation (patented system)
- Portability of solid parabolic antennas with a maximum diameter of 4 meters with their associated servitudes
- Reliability, functionality, versatility of the Control Electronics and guarantee of the announced performances and the operation safety
- Quick installation on site

### Precision system, calculated according to the maximum capacities of the axial load

- Bending moment on the installation base
- Nominal, intermittent and braking torques measured in mN
- Axis speeds and accelerations tracked in °/s and °/s<sup>2</sup>
- Angular pointing accuracy with 16-bit optical encoders

### System characteristics

- Thermostatically heated ventilated housings
- Interface plate connection on bearing housing
- Sealed and greased for life gearbox
- Static brakes with power cut-off
- Reserved pathway through the axes
- Site axis locking in survival position
- Management of operating safety devices
- Excellent resistance of the material against corrosion
- Manual mechanical control of each axis with power and brake inhibition



### Options

Telescopic sight, video camera, air dryer, air conditioning, bearing enhancement, antenna template.

### Functionality of the systems in hard climatic environments

- Wind and gusts: km/h85 -100
- Temperatures between -15 and +55
- Humidity: HR20 to 95%.



## MULTI-TECHNIQUE APPROACH

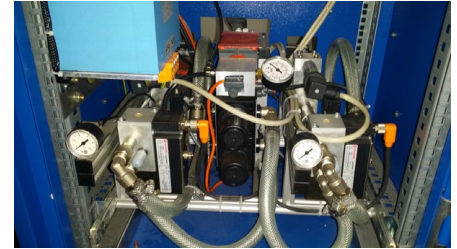
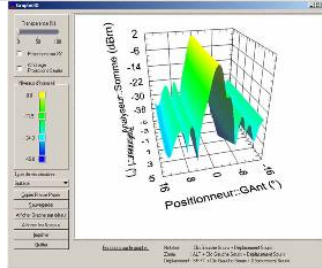
The Design Office is multidisciplinary and uses CAD tools for the deployment of:

- Mechanical design: 3D CAD, finite element calculations, dynamics, thermal, materials, surface treatments, etc.
- Electronic design: integration of industrial components and sub-assemblies, embedded electronics, automation, power electronics, etc.
- Industrial and technical software design: microprocessors, operating systems, critical real-time software, communication networks, field buses, supervision, data acquisition, remote management, signal processing, etc.
- Implementation of all types of sensors: position, speed, acceleration, gyroscopic, inertial, temperature, etc. Qualification techniques adapted to the configurations.

## QUALITY PROCESS

The systems are subjected to the following tests:

- Mechanical: vibration, shock, operational
- Environmental: climatic, corrosion and IP
- Electromagnetic Compatibility



## MRO, OP and EH

- Verification of performance indicators and customized maintenance plan for each system
- Spare parts inventory management to guarantee the reactivity required by the defense sector.
- Obsolescence is studied with the Business Managers who, in collaboration with the Design Office, propose MHO or HE solutions.
- A team is dedicated to corrective actions. It is composed of mechanics, cable installers, electrical engineers and project managers and travels throughout France and abroad. It is able to react quickly in case of urgent need.
- Technical assistance is also managed over the phone

## CERTIFICATIONS



ISO 9001 : 2015

## REFERENCES

29





ACCIS

Railway Brake  
Test Benches

SIMEF

For 15 years, over 200 brake test stations for all types of railway vehicles have been produced by CEGELEC Defense ACCIS. The company has a comprehensive expertise in the design and manufacture of Computerized Modular Brake Test Systems. This know-how is complemented by the development of fixed installations on tracks, in particular within the SNCF (French state-owned Railway company) technical centers.

• **RAILWAY BRAKE TEST BENCHES**

PRINCIPLE OF THE PNEUMATIC MODULES:

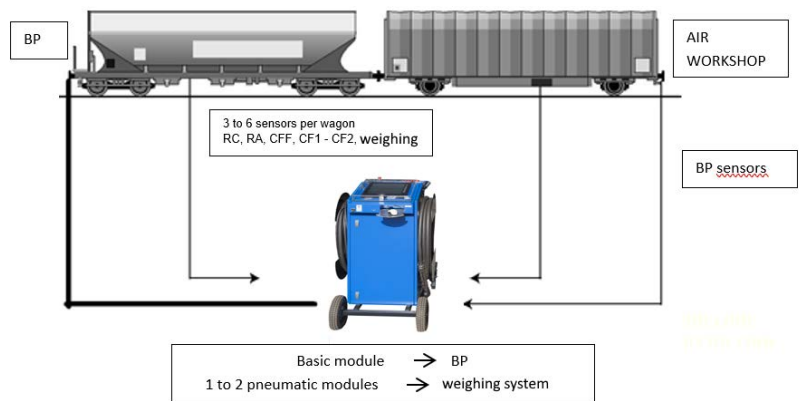
- SIMEF PI is fitted with 2 pneumatic modules with identical characteristics.
- The first module supplies the brake pipe (BP).
- The second module allows to simulate the load on a wagon fitted with relays.
- The module can also generate the Main conduct pressure.

**BRAKE TEST BENCH**

**FREIGHT CAR WORKSTATION**

- Information management with the help of a database
- Archive security and sharing
- End of phase saving helping diagnosis
- Simultaneous Brake tests on several cars
- Windows environment based softwares

SIMEF PI is supplied with 7 STAUBLI pressure measurement sensors for the pneumatic circuit and with 20 centimeters of cable and an electrical adapter for the electric part. Sensors extension cords with specific lengths are supplied for the sensors (0-10 bar).



• BP (Break Pipe)	⇒	25m
•RC	⇒	10m
•CFF	⇒	10m
•RA	⇒	10m
•CF1	⇒	15m
•CF2	⇒	15m
• WEIGHT	⇒	15m

## NEW GENERATION (NG) BRAKE TEST BENCH

The NG brake test bench allows to test all types of railway vehicles (cars, locomotives, high speed trains, work machines)  
Thanks to its hardware and software architecture, the brake test bench can control several vehicles simultaneously.

- Control of 8 cars simultaneously (8 simultaneous distributors)
- A comprehensive TGV (high speed train)
- A comprehensive TER (self-propelled train)



## PORTABLE BRAKE TEST BENCH

- For use in workshop environment or along rail track
- Easily transportable in a passenger car
- Operating within extreme temperature (-20° to + 55°C)
- Testing according to the same standard applicable to SIMEF NG and SIMEF freight versions
- Adaptable to all kinds of braking test procedures
- Ergonomic and user-friendly equipment
- Time release of maintenance sheet reduced more than half
- Measurement quality, traceability, productivity gain
- Optimized cost



## CERTIFICATIONS



ISO 9001 : 2015

## REFERENCES

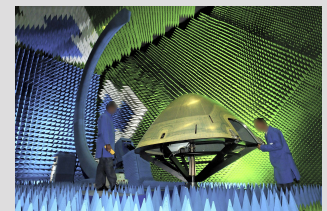




**Siepel** has been working since 1986 in the domains of ElectroMagnetic Compatibility (EMC), Antenna Measurements and the Cybersecurity of facilities :

- SHIELDING - ELECTROMAGNETIC ABSORBERS
- ANECHOIC AND REVERBERATION CHAMBERS
- ELECTROMAGNETIC PROTECTIONS FOR ROAMING OR MEETINGS
- VERIFICATION MEASUREMENTS - SURVEILLANCE COUNTER-MEASURES

Its range is designed for public and private customers in the defence, automotive, aerospace, wireless technologies



## TAILORED SOLUTIONS

- Design and manufacture of testing enclosures such as Faraday cages (including all sizes doors and feedthroughs), anechoic and reverberation chambers, electromagnetic absorbers
- Definition and supply of security means by electromagnetic protection for premises (secure rooms) and in mobility (shielded pouches, secure boxes).
- Services required throughout the life cycle of the test facilities and protections provided, related to:
  - Operations: audit, preventive or corrective maintenance, upgrades, and refits
  - Moves: dismantling, relocation, disposal, reprocessing.
- Measurement services for spectral monitoring, electronic security operations, material characterization, performances assessment of shielded rooms and anechoic/reverberation chambers according to the standards in force.



## CHALLENGES

- Ensuring a guarantee of quality, delivery and performance through a specialised production capacity that is unique in Europe: technical and human resources on one site for optimal project management.
- Creating value for customers by combining high-level technological products adapted to their needs and support engineering.
- Providing an appropriate solution for international projects, for the largest industrial groups, government organisations and research institutes.



Siepel Measurements, independent unit within the organisation has been accredited ISO17025 by COFRAC for several years. Accreditation N° 1-7068, scope available on [www.cofrac.fr](http://www.cofrac.fr)



a Business Unit of



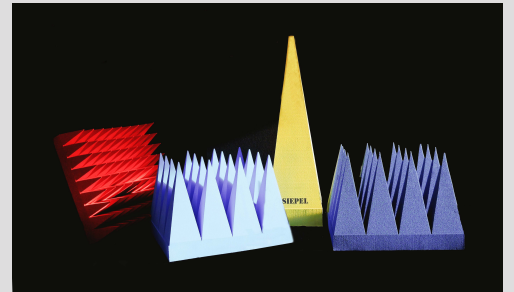
PA de Kermarquer Impasse de la Manille 56470 La Trinité-sur-Mer  
[www.siepel.com](http://www.siepel.com) - [www.cyber.siepel.com](http://www.cyber.siepel.com) Tel : +33 297 55 74 95  
[contact@siepel.com](mailto:contact@siepel.com)

# Siepel EMC & ANTENNA MEASUREMENTS



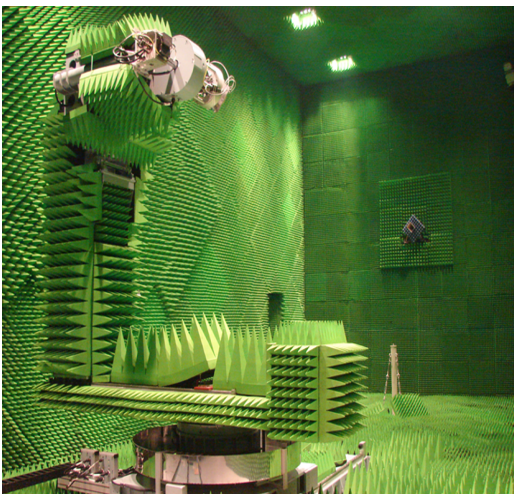
**Siepel** designs and assembles a range of products for reliable EMC and antenna measurements.

- ELECTROMAGNETIC ABSORBERS
- ANECHOIC CHAMBERS
- FARADISED RACKS & MINI-CHAMBERS
- REVERBERATION CHAMBERS



## BESPOKE PRODUCTS DELIVERED & INSTALLED ON SITE

- ANECHOIZATION - Electromagnetic wave absorbing materials: broadband pyramidal foams, narrow band absorbers, high power, and pedestrian walkway absorbers.
- ANECHOIC CHAMBERS (Faraday cages + electromagnetic absorbers) for precise and repetitive tests in an environment close to free space. Radiated emission and immunity tests are carried out in accordance with the EMC standards in force and the categories of equipment to be tested. They also allow the characterisation of antennas in the near and far field, Radar Cross Section (RCS) measurements, PIM (Passive InterModulation) adapted to telecommunication antennas or satellites in compact ranges.
- FARADISED AND ANECHOIC CABINETS & RACKS for wireless technology testing.
- Mode stirring REVERBERATION CHAMBERS: the EMC immunity and emission testing solution for automotive, military, aerospace, and civil applications. These metallic enclosures equipped with a mode stirrer can produce strong electromagnetic fields (8-10 kV/m) with optimised input power.



### RELATED FUNCTIONS INTEGRATION

- Measurement instrumentation & software
- Positioners & Near Field Measurement Scanners
- Simulation systems (TMS-Target Motion Simulators)
- Flight simulators for HWIL tests (HardWare In the Loop)
- Overhead cranes, chassis dynamometers
- High and low voltage electricity
- Air conditioning HVAC
- Access control
- Civil engineering
- Video-surveillance

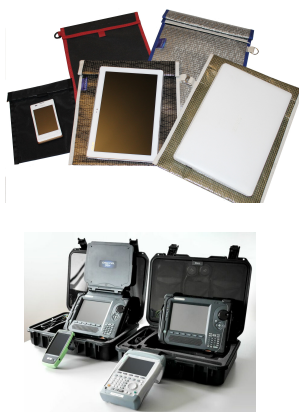


**To secure strategic data and to ensure the secrecy of sensitive meetings through electromagnetic and acoustic shielding of facilities :**

- SECURE SPEECH ROOMS for meetings confidentiality
- MOBILE SOLUTIONS FOR ELECTROMAGNETIC CYBERSECURITY
- ELECTROMAGNETIC SHIELDING /FARADIZATION
- ELECTRONIC MEASUREMENTS AND TECHNICAL SURVEILLANCE COUNTERMEASURES

## CONFIDENTIALITY SOLUTIONS

- SOTERIA: double protection of rooms (electromagnetic + acoustics)
- Secure Box: Security case blocking any connection to GSM, 3G/4G/5G, Bluetooth, Wi-Fi networks of mobile communication devices and preventing voice recording during a meeting
- Electromagnetic protection of data centres, command centres and premises housing information systems
- Faradised pouches: Electromagnetic protection of phones, computers, tablets ... to secure exchanges in all circumstances (travel, meeting, roaming)



## SPECIFIC MEASUREMENTS

On-site electronic measurements, Technical Surveillance CounterMeasures (TSCM or bug sweeping): for the detection and identification of any malicious listening and surveillance systems present in a room, a vehicle, a ship

Spectral analysis: ARAN is a continuous electromagnetic spectrum monitoring equipment capable of detecting any undesired communication in a meeting room.

Shielding measurements: performance measurements of all types of Faraday cages

Tempest Zoning: measurement of electromagnetic attenuation in any room or building

# VINCI ENERGIES

In a world undergoing constant change, VINCI Energies focuses on connections, performance, energy efficiency and data to fast-track the rollout of new technologies and support two major changes: the digital transformation and the energy transition. Keeping pace with market change, VINCI Energies supports its customers by offering increasingly innovative solutions and services, from design to implementation, operation and maintenance.

VINCI Energies applies a multi-local business model based on entrepreneurship and networking of all its expertise, working closely with its customers to create value day-to-day.

Operating in 54 countries worldwide, our 1,800 business units intervene in infrastructure, industry, service sector and information and communications technology (ICT).

They are organized around five international brands – Omexom, Citeos, Actemium, VINCI Facilities and Axians – in addition to brands with a more regional identity.

- **Omexom** : VINCI Energies' brand specialized in electrical power generation, transmission, transformation and distribution
- **Citéos** : VINCI Energies' lighting and dynamic urban equipment brand, continues to make cities more attractive, safe and enjoyable thanks to environmentally friendly solutions.
- **Actemium** : VINCI Energies brand dedicated to industrial processes and performance ; an active participant in the move to smart industry
- **Vinci Facilities** : proposes a customized offer carried by facility management solutions that combine multi-technical maintenance, operation and user services
- **Axians** : VINCI Energies brand dedicated to information and communications technology (ICT) ; from IT infrastructure and services to digital transformation

With locations in Europe, Africa, Asia, the Americas, Oceania and the Middle East, the VINCI Energies Group boasts a headcount of 83,800 employees distributed across the globe. VINCI Energies Group operates in 54 countries worldwide. The Group generates 48% of its 13.7 billion € revenue abroad.

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1 800 Business Units and  
4 international brands  
for a multi-local  
business at world scale

83 800 employees  
located in 54 countries  
worldwide for local and  
global solutions

13.7 billion €  
turnover in 2021

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1 rond-point du Général Eisenhower  
CS 40605  
F 31106 TOULOUSE CEDEX 1  
Tél : +33 562 870 000 - Fax : +33 562 870 001  
E-mail : [defense.toulouse@cegelec.com](mailto:defense.toulouse@cegelec.com)  
[www.cegelec-defense.com](http://www.cegelec-defense.com)

