CESA
CEMENT ENGINEERING SA

EXPERIENCE

COMPETENCE

INDEPENDENCE

CESA at a glance

Competences

- Project management
- Process engineering
- Mechanical engineering
- Electrical and automation engineering
- Civil engineering
- Geology and quarry extraction management
- Erection and site management
- Commissioning
- Plant operation

Fields of Activity

- Cement plant project
- Clinker and coal grinding station
- Power plant
- Alternative fuels implementation
- Waste heat recovery
- Atmospheric emissions control
- Raw material studies
- Quarries planning

Services

- Feasibility studies
  (Market, raw materials, technical and process, economical and financial, as well as environmental studies)
- Tenders to suppliers and contract negociations
- Project management (EPC and multiple packages)
- Expertise and engineering
- Audit and due diligence
- Environmental and social impact assessment
- Geological exploration and quarry scheduling
- Quarry rehabilitation

Our Consulting and Engineering Philosophy

Technological developments in the cement industry request constant innovative thinking, not only in process but also in environmental performances.

CESA was created in Geneva, Switzerland, by Jean-Paul Stoffels, who graduated from the Swiss Federal Institute of Technology. He is one of the most experienced consultant engineers within the cement world. CESA excellence is based on the decades of international experience of its specialists. The company offers its engineering, industrial consultancy, and management services worldwide to the cement, mining and construction materials industries. For all projects, from feasibility studies to commissioning, CESA guarantees services with the highest level of quality and accuracy in line with the hallmark of its home country.

OUR EXPERIENCE

IS THE SUCCESS

OF YOUR PROJECTS

Jean Paul Stoffels

***T**hinking in total independence and working in full cooperation with our partners is the basis of our Consulting Engineer's philosophy .*

The effective implementation of our expertise to achieve the best results for our clients, while always prioritising environment protection and energy savings, is a predominant aspect of our vision of the future.

Engineering is know-how and know-how is held by people. Therefore, our main resource is the combination of individual knowledge and skills, acquired through decades of experience by each of our engineers and experts, and team work. This interaction is the guarantee for innovative solutions integrating the latest developments in cement technology for the benefits of your projects.

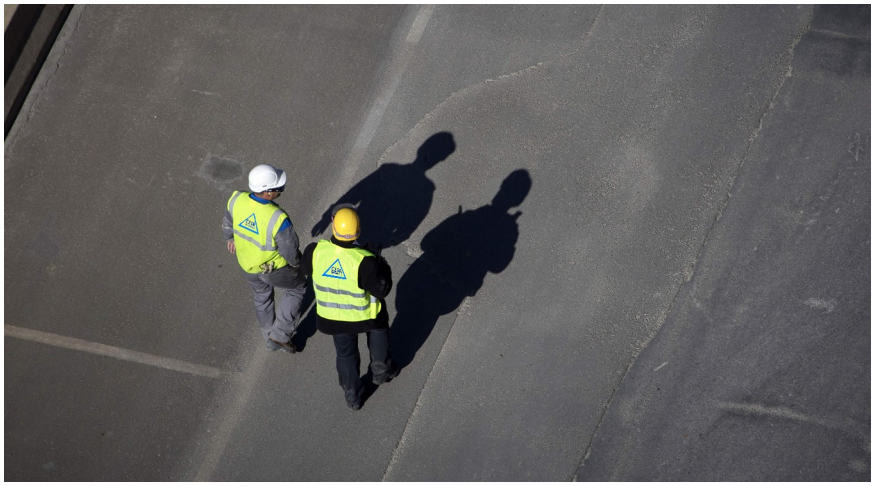
Your satisfaction is our motivation. Our experience is your strength.

Jean Paul Stoffels

President

Expertise & Know-How

Technical achievements are not simply the sum of the best partial solutions, but are the result of the close collaboration of a flexible, motivated and competent team, where each link of the chain is foolproof. This allows for great flexibility in execution, which is the primary prerequisite for success. This approach generates great satisfaction among our clients, resulting in mutual trust and a common desire for success.



Experience
Expertise
Enthusiasm
Flexibility
Motivation
Skills

For all sectors of the cement and building materials industries, CESA is your worldwide partner as consulting engineer for the analysis, the development and implementation of your projects.

The success of CESA's project management comes from the work of highly qualified and highly motivated teams, with an experienced project manager who remains your direct partner throughout the project.

Flexibility, motivation, a desire for success, rapid decision-making in a decentralized organization, each responsible in its position, guarantee a smooth execution of your projects with tailor-made and optimal solutions for each problem.

This is the CESA loyalty and guarantee label for a consistent service that is only completed with your full satisfaction.

This is possible thanks to CESA's total independence toward any providers assuring complete loyalty towards the customers and their interests.

The expertise of our engineers and experts, who all have 15 to 35 years of experience, is supported by the most modern tools, among others:

- COMFAR III Expert from UNIDO for financial and economical analysis and profitability
- Autocad, Solidworks and 3D Studio Max for design
- AXIS VM11 for the calculation of structures
- Surpac for 3D geological modelling and Minesched for quarry scheduling, both from Dassault Systèmes

Innovations
For
Your
Satisfaction

Precision is our motto

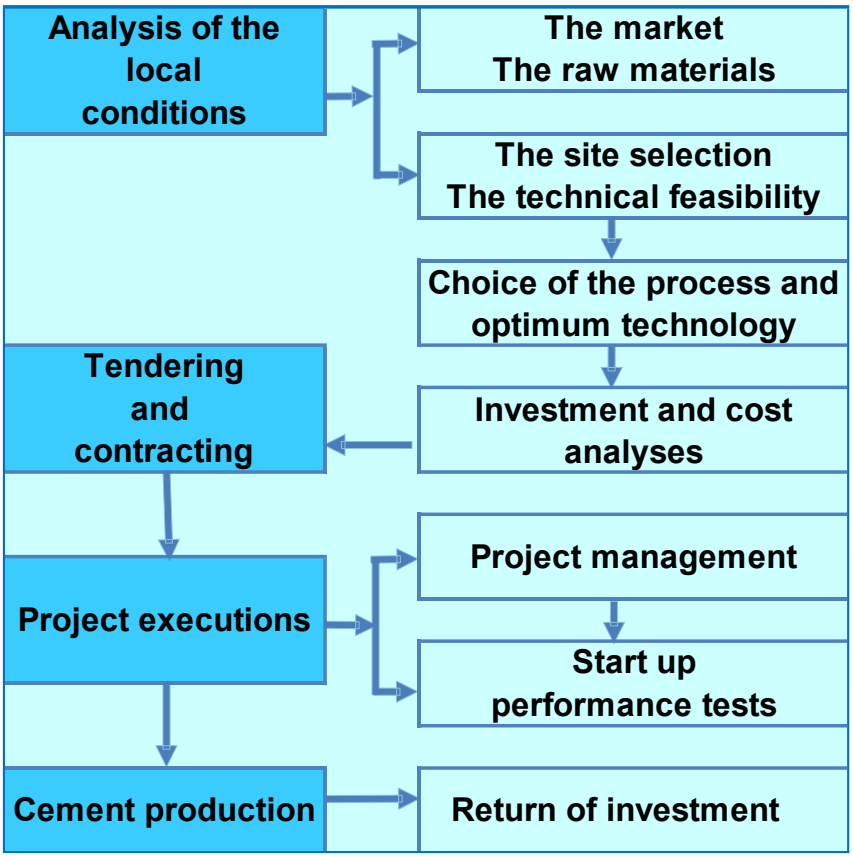
We focus on your needs

All necessary skills are available in house at CESA for the complete realisation of a cement plant. Wherever the project is located, CESA provides a full service including technical and socio-economic studies, raw materials investigations, project management, supervision of the construction, as well as staff training and monitoring of the plant operation.

Our Services :

- Bankable feasibility study:
  - Market study
  - Raw materials study
  - Technical concepts
  - Economical study
  - Financial study
  - Environmental study
  - Master plan
- Project management (turnkey and multi-lot)
- Geological and quarrying modelling
- Studies of civil engineering and buildings. Geophysical Studies
- Engineering of mechanical constructions, electrical constructions and automations
- Power plants and generators
- Construction site management, construction supervision
- Commissioning
- Factory inspections and audits
- Capacity extensions
- Risk Studies and Management
- Site and quarry rehabilitation studies
- Recovery of residual heat

PROJECT MILESTONE



Ciments du Sahel, Kirène

Due Diligence & Technical Audit

A team able to build a complete cement plant has also the ability to assess the situation of an existing cement plant, evaluate its level of maintenance and estimate its actual value. On this basis, the experts of CESA

Due Diligence and Technical Audit

Inspection:

- Regional infrastructure
- Plant design evaluation
- Organisational chart
- Utilisation and reliability factor
- Predictive maintenance program evaluation
- House keeping
- Equipment inventories
- Plant value estimation

Propositions:

- Productivity improvements possibilities
- Cost of refitting
- Upgrading options
- Financial evaluation of investments (CAPEX)
- Operating cost estimates

Our missions are lead by the wishes of our customers, the specifications and the particular characteristics of the plant and the site. For each project, we provide exclusive productivity and energy saving solutions.

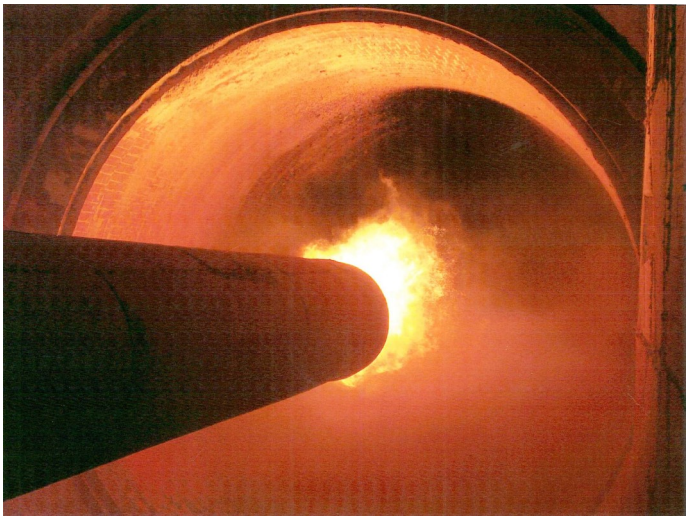
The Energy Challenge

The main challenge for mankind in the 21st century is certainly the efficient generation and utilisation of energy, in all their forms.

Therefore, the experts of CESA always focus a special attention to this topic and inform our customer of the increasing need to deal cautiously with energy and materials. From feasibility study to construction, our studies are always conducted in the view of efficient energy consumption and optimal raw materials utilisation.

Nowadays, many solutions are well proven regarding waste heat recovery and alternative fuels, in particular in the use of industrial, agricultural and household waste, as these are available in increasing quantities.

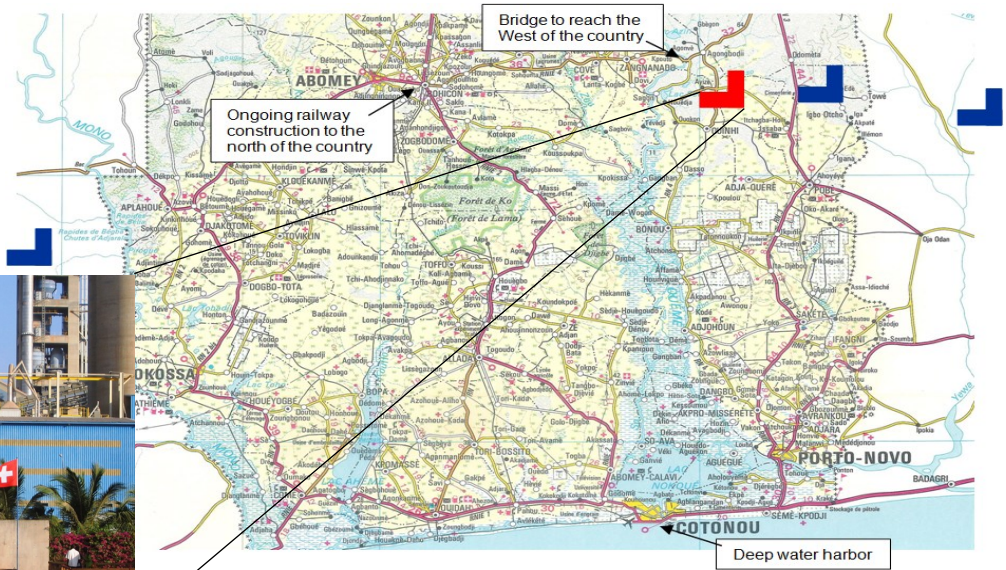
It is the pride of the team of CESA to act in this way and contribute to make the Earth a better place to live.



Providing cement engineering services without ensuring first that the planned plant is located near a stable market and where production costs are competitive would not make sense. Accordingly, CESA starts analysing the socio-economic conditions of the proposed site before recommending the construction of a cement plant.

This analysis includes in particular:

- Assessment of the potential market
  - Study of the building materials prices
  - Trend analyses for the medium and long term consumption
  - Stakeholders of the cement market
- Raw material exploration and analysis:
  - Deposit exploration and resource evaluation
  - Selection of production process and specific equipment
  - Quarry scheduling and reserve estimation
- Technical feasibility and technical concept:
  - Following the raw material analysis, the outline of the process, the mechanical, and the electrical and control concepts are defined as well, as the general layout.
- Cost estimation and financial analysis:
  - A compilation of investment, operating and sales costs provides the basis for a comprehensive financial projection
  - Assessment of financial investments (UNIDO program: COMFAR III Expert)
- Environmental impact and management plan:
  - Review of the local and international environmental laws
  - Contact and cooperation with local authorities
  - Review of requirements for building permits procedures

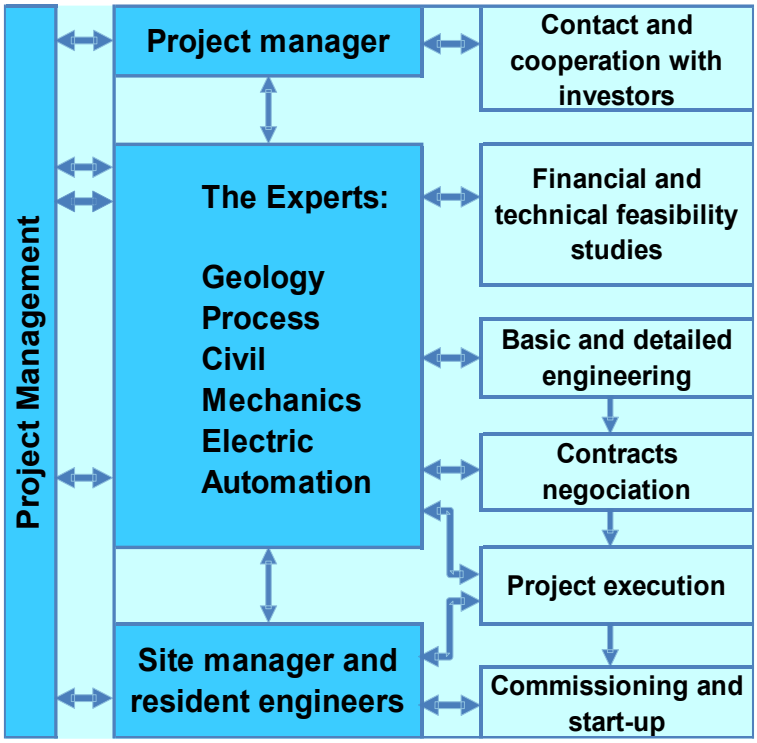


Project Management

The major challenge in a cement project are the continuation and consistence between studies, construction and commissioning. This is an evidence for CESA and is made possible thanks to the great experience of its team and constitute an important asset. Another major advantage of our services is the effective independence of CESA with regards to the equipment suppliers or any other player. Therefore, our customers can rest assured that all the efforts of CESA are devoted to protecting their interests.

- Project definition (turnkey, multiple package)
- Basic and detailed engineering
- Negotiations and drafting of contracts
- Inspection and reception of equipment
- Quality Control
- Packaging and shipments
- Site construction management
- Monitoring cost and planning
- Start-up and commissioning assistance
- Performance verification and warranties
- Staff training
- Validation of environmental, health and safety plans

PROJECT ORGANISATION



Construction and Site Management

It is during the construction and commissioning where the success of the project shows up. This is where CESA makes the difference thanks to its comprehensive practical experience.

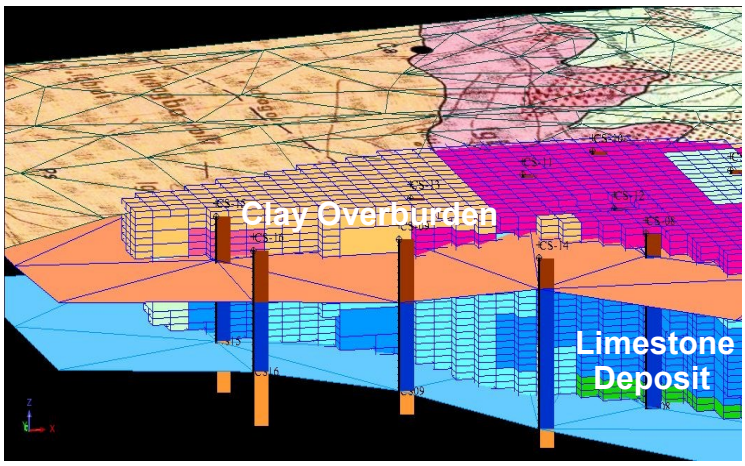
Ohorongo cement plant—Construction phase

- Construction, supervision and control:
  - Verification of plans
  - Inspection of equipment
  - On site fabrication follow-up
  - Construction material testing
  - Supervision of construction and erection
- Start-up and production:
  - Assistance to start-up
  - Verification of performance guarantees
  - Certificates of acceptance
  - Staff training
  - Plant conduct

Geology and Mining

For a cement plant, the raw material is one of its important assets. Its extraction has a significant impact on the exploitation costs. Detailed knowledge of the raw material will allow increasing the life of mine of the deposit by proper blending, and assure a steady output in terms of quality and quantity.

Furthermore, improved and simplified quarry operation results in less fuel consumption per ton of raw material extracted. Steady raw mix composition allows optimising the clinker manufacturing process, and better clinker quality allows blending more additives.



3D geological and block model over regional geological map

In order to optimize the exploitation of the raw material, a sequence of working stages has to be implemented:

- Regional geology for site preselection
- Geological exploration
- Planning and supervision of drilling campaigns
- Evaluation of raw material qualities
- 3D geological modelling and bloc model estimation
- Resource evaluation
- Quarry scheduling and planning
- Water management
- Selection of quarry equipment and quarry commissioning

Know your raw materials: it pays!

Quarry Rehabilitation

Now a day, quarry rehabilitation should not just be an option for environmentally conscious cement producer but be an integral part of the mining plan. Indeed, the cement industry has well understood the benefit of rehabilitation. Guidelines are published by the Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development (WBCSD) showing that the long term environmental and social benefits outweigh the direct costs of rehabilitation.

Rehabilitation would with benefit be implemented progressively as the quarry exploitation is carried out. Costs are spread over the life-time of the quarry and it shows the local community that the cement producer is serious about it sustainable commitment.

Thanks to its overall understanding of the cement business, CESA will guide its customers through an effective and responsible process of quarry rehabilitation, taking into accounts the needs and expectation of all stakeholders.
The added value that CESA offers is:

- Proposing projects that have sustainable technical and financial objectives
- Emphasis on safety aspects
- Coordinate, implement, and monitor rehabilitation progress
- Act as a neutral (independent) adviser towards all stakeholder

Quarry rehabilitation is a part of the license to operate towards the local community

Engineering

The engineering department of CESA is specialized in the design, the construction, and the project management for heavy industry units, particularly in the cement sector. This includes design study, planning, coordination and supervision of the construction and commissioning of equipment and production units.

Process

Our mechanical engineering department excels in design and construction of heavy industrial plants and in the management of such projects.

Additionally, it has been fully involved in many plant commissioning and plant revamping throughout the world. The responsabilities included planning, coordination and supervision of plant erection and equipment installation.

- Production capacity scenarios
- Plant layout
- Main production units definition:
  - Crusher and mills
  - Preheater and calcinator types
  - Kiln and cooler types
  - Silo volumes and storage capacities
- Raw mix design
- Definition of process control
  - By-pass
  - Emissions evaluation and mitigation
- Process design and optimization
- Fuel diversification
- Quality control
- Central laboratory specifications

Kiln inlet

Mechanical

- Control of plans
- General arrangement drawing
- Mass flow diagrams
- Equipment sizing and selection
- Establishment of equipment specifications
- Analysis of the tender's proposal
- Equipment fabrication inspection
- Method statement for equipment installation
- Assistance to commissioning
- Control of the performance guaranties
- As built documents

Complexity of the plant

Electrical & Automation

The importance of electrical & control systems increased these last years in the cement industry due to innovative development of more efficient equipment, such as sensors and analysers, power electronics and computer systems.

The electrical team is very experienced in the fundamentals of electrical control and instrumentation for the cement industry, but also familiar with the new leading edge technologies. The special fields of knowledge include process instrumentation and control system, regulatory compliance, IT and communication networks.

- High and medium voltage network concept and design
- Specification and evaluation of electrical power and distribution equipment
- Selection of process control and instrumentation
- Specification of equipment and design of installations for hazardous locations
- Fire fighting control
- Design of industrial electrical systems including lighting, communications, grounding, heat tracing, etc.
- Programming and automation
- Power management systems
- Control rooms and plant monitoring systems
- Construction follow-up, checkout, and start-up

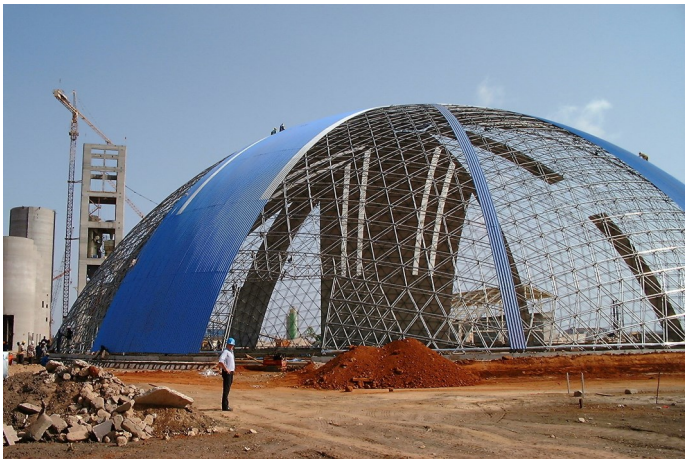
Low voltage electrical room

Civil Works & Structural Steel

The civil team is composed of architects and civil engineers. Their skills cover all civil engineering expertise required for cement plant construction such as : heavy duty foundation under vibration, large prestressed silos, kiln pier, preheater towers, dome or space structures for storage and all kinds of industrial or non-industrial buildings encountered in the cement industry.

The department participates in all steps of a cement project form the conception stage to the supervisions in the construction phase, in particular :

- Site selection and general layout optimisation
- Site levelling, roads and transport planning



Circular Pre-blending dome

- Soil investigation and foundation concept including soil improvement and piling
- Specifications for design and construction
  - Design guidelines
  - Material and workmanships specifications for concrete, prestrassed, slipform, steel structures, etc.
- Structure design of all kind of industrial buildings/ structures, including :
  - Design with European, American, Chinese, and other international codes
  - Finite element analysis and design
  - Design check and peer to peer review
- Network concept & design
- Inspection, appraisals and retrofit of existing buildings when upgrading and revamping installations

Extraction Belt conveyor from storage

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