cm.project.ing

Holistic glass plant engineering
and project management

SCVK Congo

FEED – Presentation

CONTENT / STRUCTURE

1) Company – Presentation
   - CMP – Presentation
   - References

2) SCVKs previous efforts
   - Land purchase
   - Topography
   - Soil analysis
     - Groundwater situation

3) Layout & Site
   - 2D (top view, sections, material flow diagram)
     - Description of equipment / quality aspects
     - LPG and Diesel concept
     - Energy organization / consumption
     - Fire fighting concept
   - 3D – animation
   - Presentation of civil works (site preparation, access, building constructions, streets and places etc.)

4) Raw materials organization
   - Raw materials situation and infrastructure (available, import, preparation, map)

CONTENT / STRUCTURE

5) Plant Organization
   - Organigram, plant structure
   - Training & TAA

6) Time planning
   - Time schedule (30 month)

7) CAPEX
   - CAPEX - overview
   - Main systems
   - Utilities
   - Cash flow planning during the project

8) OPEX
   - Sales plan
   - Production planning (Brasco, Bralico, bottle type, capacity)
   - Customer structure

9) Congo benefits
   - Import / custom clearance
   - Currency splitting €/FCA - pie chart (works in Congo -> architecture, brick layer etc.)

CMP PRESENTATION

The CM.PROJECT.ING GmbH is the competent partner for all engineering and project management tasks in the field of glass industry. As an independent consultant and engineering provider we are not bound by technical limits. We offer our „custom made“ solutions for all different requirements of the glass industry.

CM.PROJECT.ING was established in 2007 by Dr Daniel Schippan. Dr Schippan’s postdoctoral paper was on the container glass industry and led to a distinguished career with URSA international. During his time with URSA, he was responsible for international growth investment projects, both green-field new builds and brown-field re-investment cases. Before establishing CM.PROJECT.ING, Dr Schippan was Plant Manager and permanent member (CPO) of the Operating Unit Board of URSA International.




Additional the cm.project.ing is member of several Glass organization to be up to date for new technologies and to increase the know how of the company.

Further cm.project.ing increased it‘s professional skills in project management with examinations and certificates of Microsoft Project Management.

CMP PRESENTATION

The cm.project.ing Team has tremendous experience in all levels from different companies:

- CPO / COO
- Plant Manager
- Production Manager
- Maintenance Manager
- Engineering
- Technical Draftsperson
- Project Management

CMP PRESENTATION

Holistic **Project Management** and **Engineering** in investment projects :

- **FEED Study**
- **Sales support**
- **Funding**
- **Investors support**
- **Concept Engineering and Project Organization**
- **Detailed Engineering and Planning**
- **Procurement and Contracting**
- **Interface Engineering**
- **Installation Phase**
- **Commissioning and Performance**
- **TAA (Technical Assistance Agreement)**

CMP PRESENTATION

The cm.project.ing is a world wide active global player. The headquarter is located in Jülich, Germany. In 2012, the cm.project.ing East Europe and Russia in Sosnowiec, Poland and in 2014 an additional office in Sao Paulo, Brazil were founded to support the projects in the eastern regions of Europe and Russia and the western regions of South America. To realize a successful the project in Congo cm.project.ing wants to open a new office in Congo.

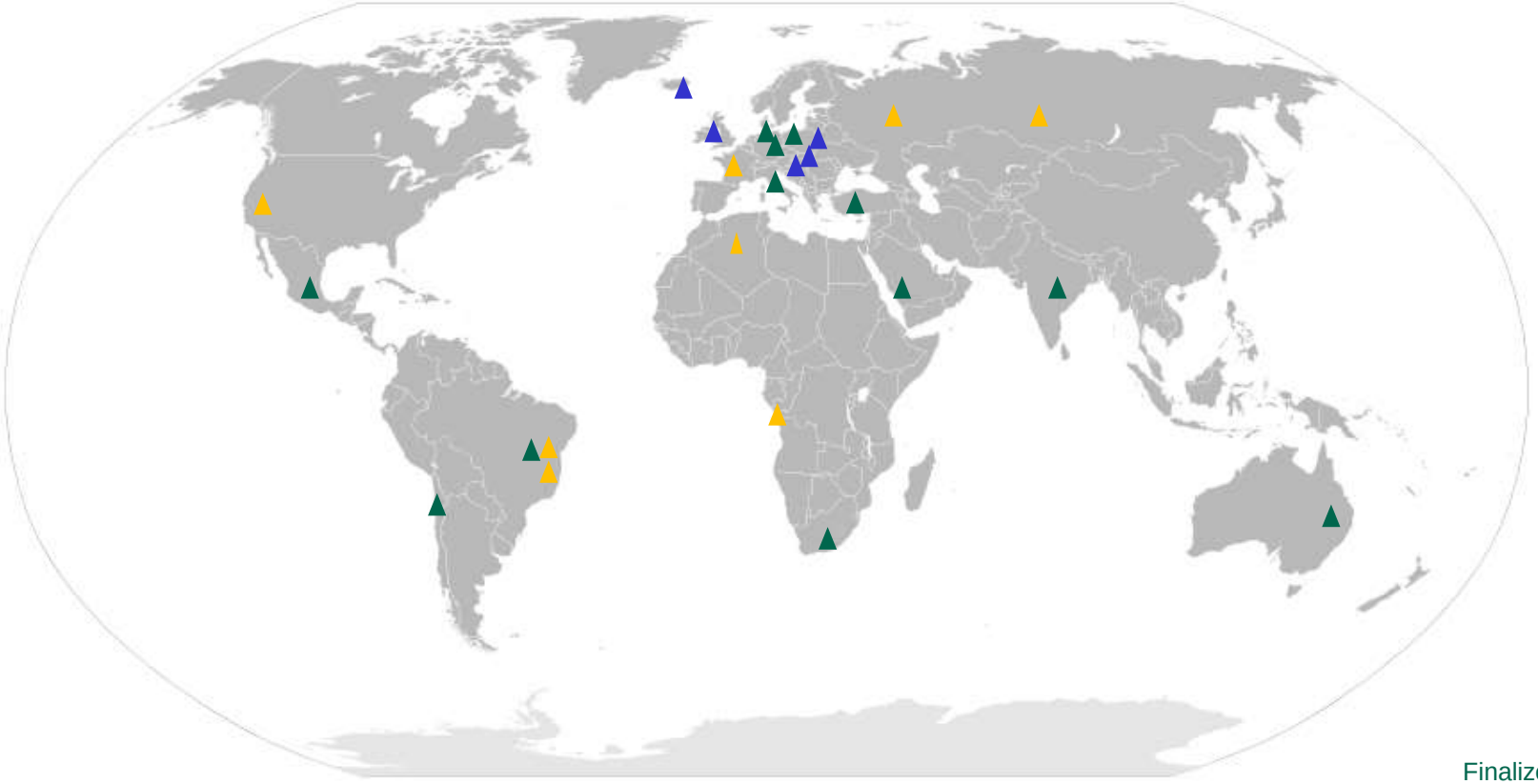
REFERENCES

The cm.project.ing GmbH has managed in the past several EPC and EPCM projects with an investment from 3 Mio€ up to 120 mio € per Project. International EPC and EPCM glass growth investment projects of the last 5 years

	AGENDA GLAS AG		Sorg		SUPERGLASS	ROTAFLEX	BRAZIL	ГЛАВ СТРОЙ	GÜRALLAR	Ethiopia
	CONTAINER GLASS PLANT	GLASS PRODUCTION PLANT	CONTAINER GLASS PLANT	GLASS PRODUCTION PLANT	GLASS PRODUCTION PLANT	CONTAINER GLASS PLANT	GLASS PRODUCTION PLANT	CONTAINER GLASS PLANT	CONTAINER GLASS PLANT
START	01/2009	05/2008	03/2011	12/2011	08/2012	09/2013	09/2013	07/2014	08/2014
COMMISSIONING	02/2010	02/2011	10/2012	12/2012	04/2013	07/2014	09/2015	10/2014	02/2015
INVESTMENT	55 mio €	120 mio €	55 mio €	6,5 mio £	2,9 mio €	240 mio BRL	40 mio €		
TONNAGE	310 tpd	220 tpd	200 tpd	101,3 tpd	13,1 tpd	400 tpd	60 tpd	Basic Engineering 350 tpd	Basic Engineering 124 tpd

REFERENCES

International EPC and EPCM glass investment projects.



Finalized projects
Running Projects
Smaller Investment Projects of the Group

REFERENCES - Agenda Glas 2010 – Container Glass

Agenda Glas AG built a container glass plant for the production of white glass with an capacity of 100,000 t/a, representing an annual production capacity of approximately 300 million bottles and jars. The production started in February 2010. Agenda Glas AG, located in Gardelegen / Germany was founded in 2008 and has currently about 145 employees. The total investment for this "Greenfield Solution“ was roughly € 55 Mio.

The cm.project.ing GmbH, realized for Agenda Glas AG the total project tasks of project management and site coordination. Furthermore, the general engineering specialized on core technology, utility engineering and the implementation and control of interface design was realized and coordinated by the cm.project.ing.

EPCM Germany 400 days € 55 Mio

REFERENCES - Agenda Glas 2010 – Container Glass

REFERENCES - Huta Szkla Tur 2012 – Container Glass

Sort sp. z o.o. built a container glass plant for the production of white glass. The capacity should be 130 tons/d of net glass production on three production lines with the total investment of roughly € 50 Mio. The commissioning is already done in 2012

As a turnkey project, the following elements included:

- All process parts excluded civil works
- All mechanical installation works
- All electrical works
- All automation and control works

EPC Poland 17 Month € 50 Mio

REFERENCES - *Huta Szkla Tur 2012 – Container Glass*

REFERENCES - Vidroporto 2014 – Container Glass

Vidroporto S.A. built up a container glass plant for the production of beer bottles The capacity should be 350 tons/d of net glass Production on three production lines with the total investment of roughly € 70 Mio. The commissioning is expected by October 2014. The total core technology of the process will be delivered by the Glass Alliance (Zippe, Horn, Bucher Emhart and MSK)

The following scope of supply is carried out:

- Risk Management
- Project Management
- Interface Engineering
- Utility Engineering
- Site Supervision

EPCM Brazil 16 month € 70 Mio

REFERENCES Verallia 2014 – Container Glass

Saint-Gobain Vidros S.A. is building up a new facility in North East Brazil in order to produce glass containers. This new facility will produce in a first phase 80 KTon/year with 2 production lines and in a second phase the capacity will increase to 110 KTon/year with a third line. In the future, it is possible to construct a second furnace.

The following scope of supply is carried out:

- Project Management
- Interface Engineering and Management
- Site Supervision
- Utility Engineering
- Process Related Interface Engineering

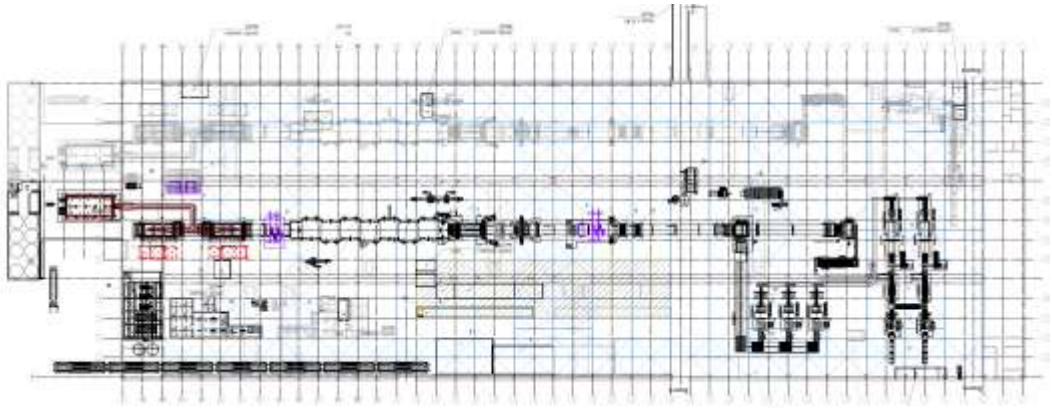
EPCM Brazil 20 month € 75 Mio

REFERENCES - Technonicol 2014 – Glass wool

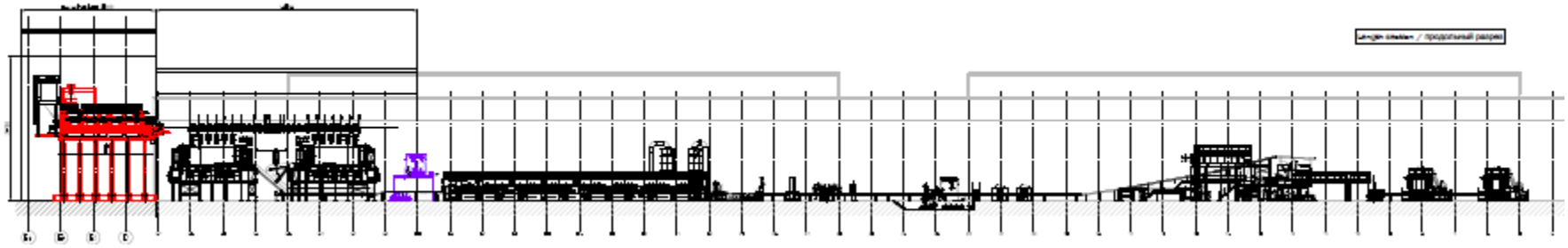
Technonicol intends to build a new glass wool facility with a daily production of 190 tons/day.
The total investment is roughly € 63 Mio. The expected start up is June 2016.

The following scope of supply
is carried out:

- Engineering of the complete process and utilities
- Layouting and architectural concept
- Project Management
- Interface Engineering and Management
- Risk Management



FEED Russia 26 month € 63 Mio



REFERENCES - Teploprom 2014 - Glasswool

Teploprom builds a plant for the production of glass wool with an capacity of 60 tons/day and 120 tons/day in the second step.

The planned start up of the project is February 2016.

The total investment for this “Greenfield solution” is around € 40 Mio.

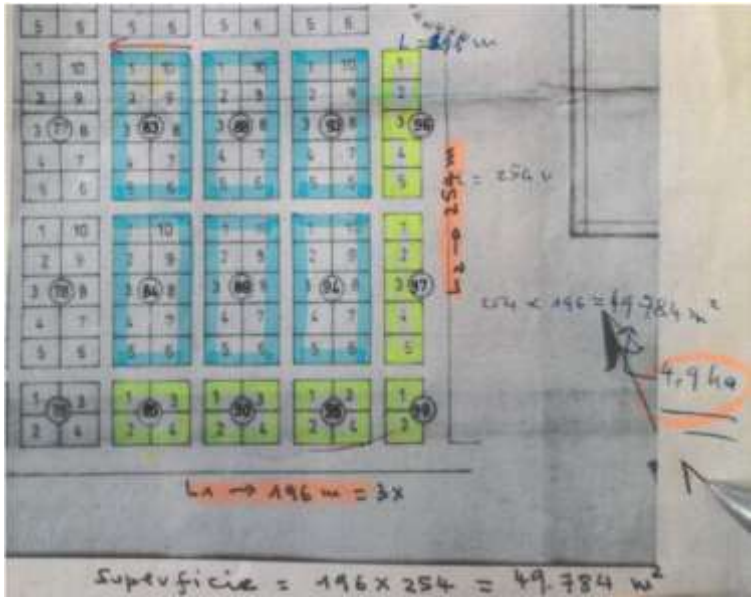
The following scope of supply is carried out:

- Engineering of the complete process and utilities
- Layouting and architectural concept
- Project Management
- Interface Engineering and Management
- Risk Management

EPCM Russia 24 month € 40 Mio

SCVKs PREVIOUS EFFORTS - Land purchase

SCVK invested already a lot of man power and money to realize the project and bring the project to the next step. First of all they bought a land plot in Pointe Noire where the Project can be realized. The size of the these plot are 196m x 254m (4,9 ha).



It is located directly beside the company **Bralico** and near the company **Socofran**.

Socofran

Socofran mad already the topographical analysis and the soil analysis for SCVK. In the past they built the brewery Bralico. Due to this fact they have a very good experience and knows exactly the local conditions.

Bralico

Bralico is a already existing brewery in Pointe Noire and one of the potential customer of SCVK. The very short distance is an ideal basis to get in close corporation with that company.

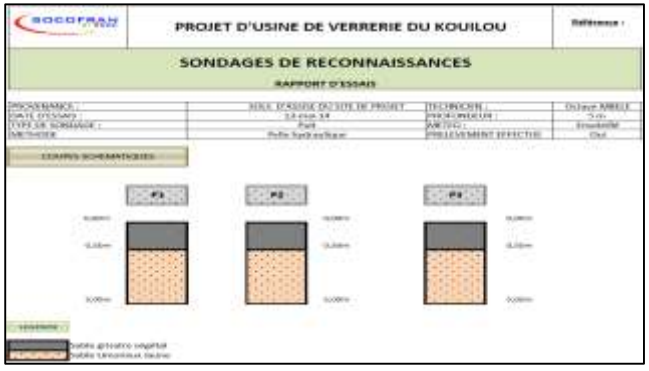
SCVKs PREVIOUS EFFORTS –

Topographical *analysis, Soil analysis*

To make a meaningful and elaborated concept of the project, SCVK get in close contact and corporation with the cm.project.ing. cm.projecting made a FEED – study to develop the first concept and engineering of the plant. Therefore Dr. Shippan and his team was already in Congo to get a feeling for the project and to have constructive meetings with SCVK and Socofran. Also the SCVK-Team was already in Germany to discuss the concepts, layouts etc.

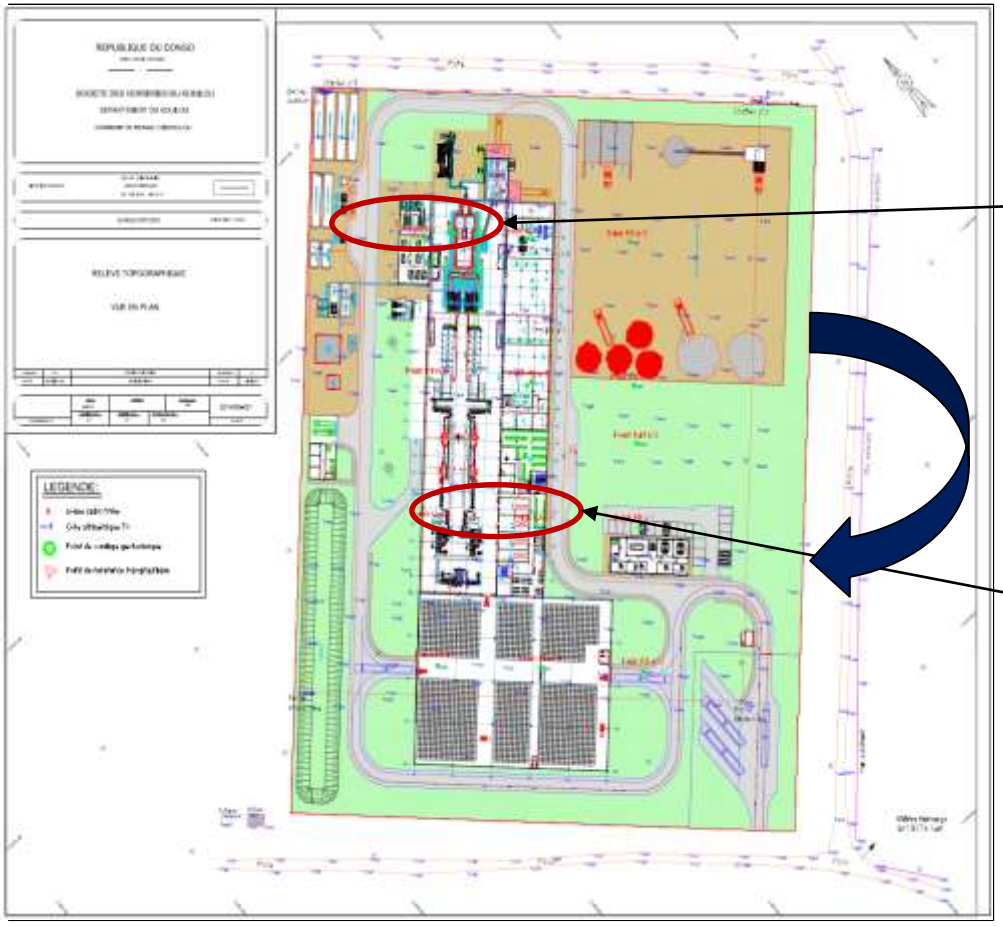
For the layout planning it is very important to know the topographical analysis and Soil analysis of the land plot. Thereby it is possible to plan the buildings with their foundations and the wells to be independent of the city water. Furthermore the topographical analysis shows the gradient of the site. This knowledge is very important because cm.project.ing can take advantage of the gradient by planning the placement of the several buildings.

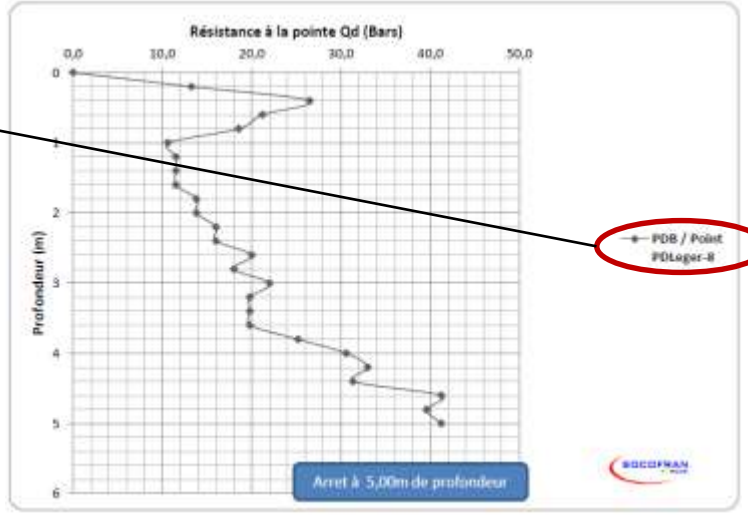
The topographical analysis as well as the soil analysis was paid and organized in close work with cm.project.ing to bring this very interesting project on the right way



SCVKs PREVIOUS EFFORTS –

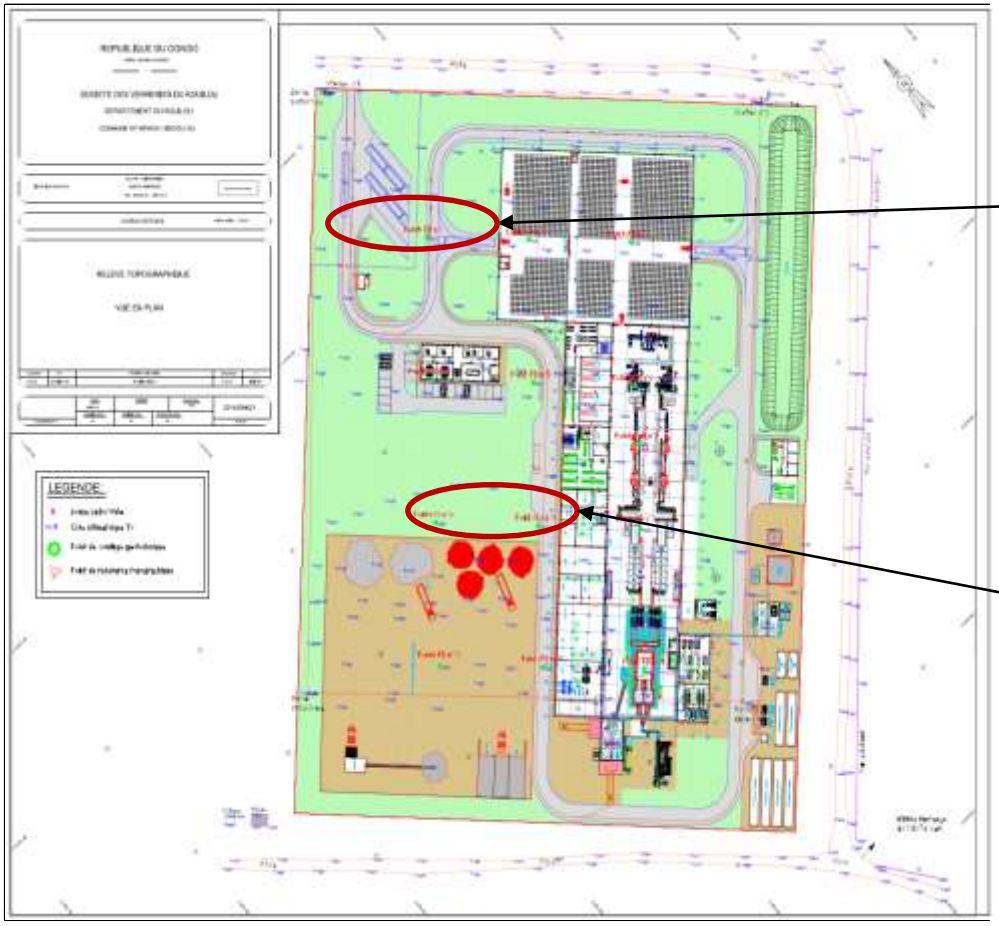
Topographical *analysis, Soil analysis*

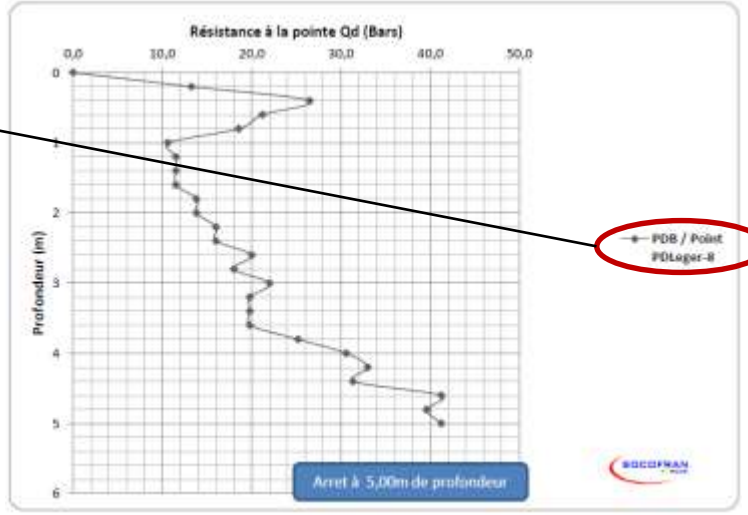




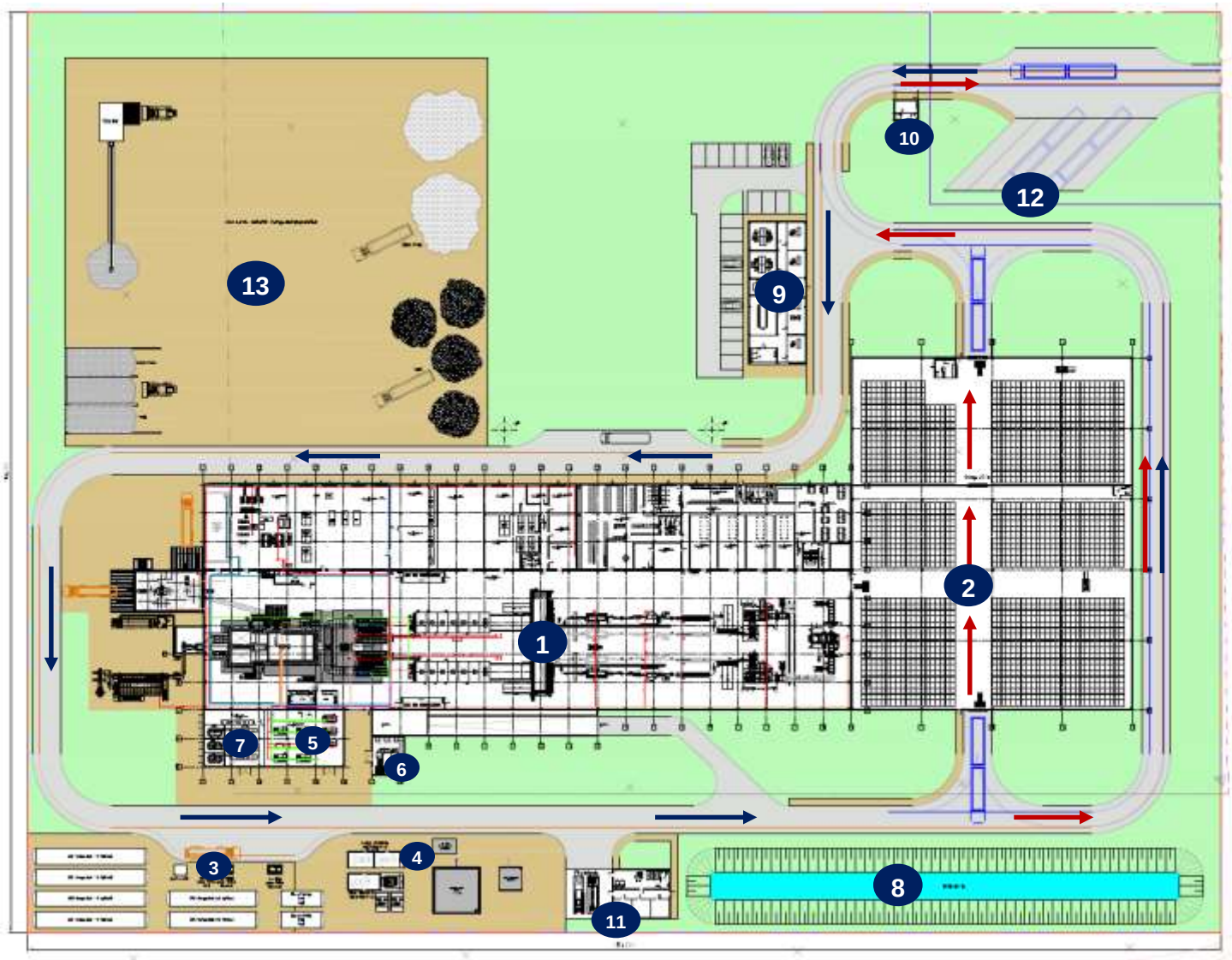
SCVKs PREVIOUS EFFORTS –

Topographical *analysis, Soil analysis*





LAYOUT & SITE 2D – Site overview

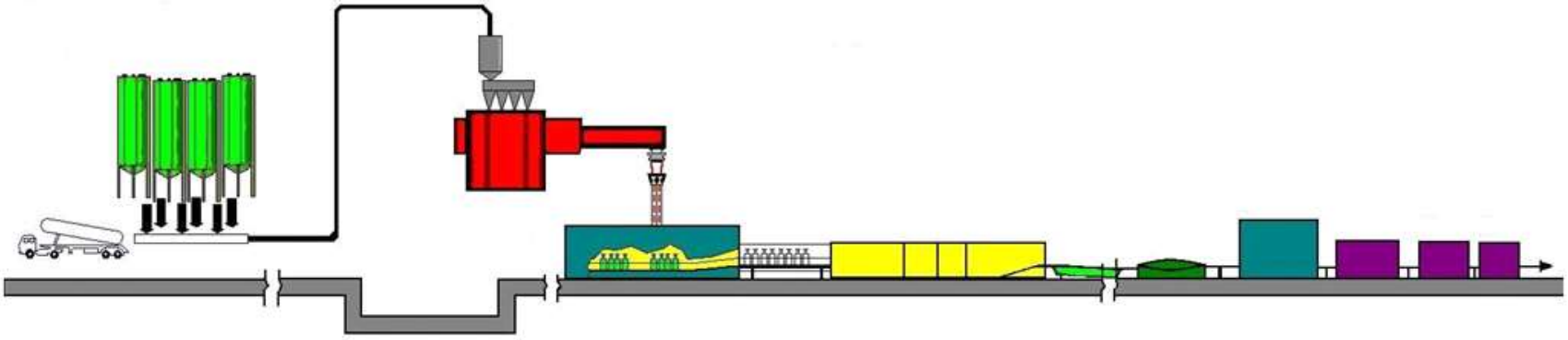


inbound

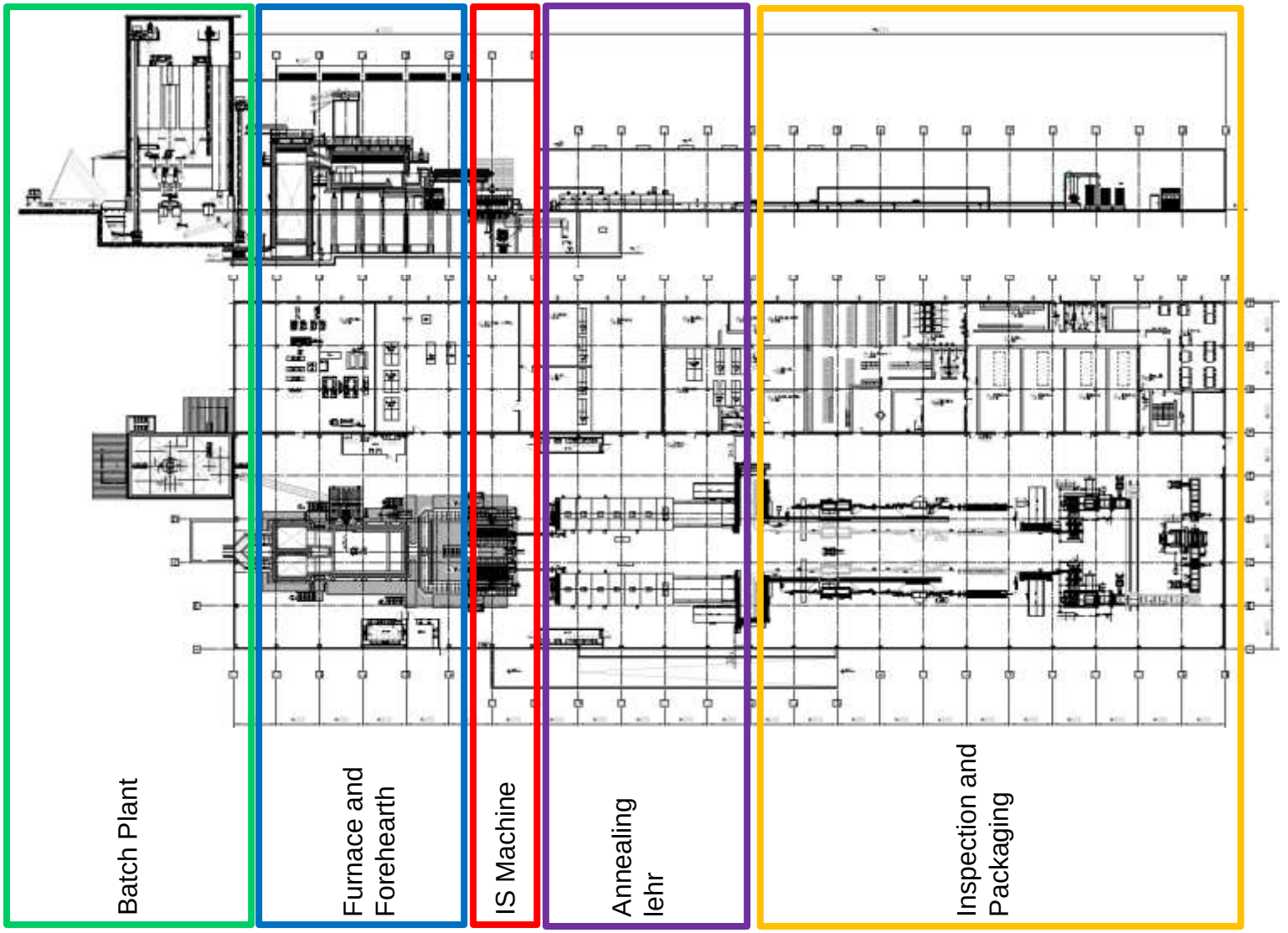
outbound

1) Production Building
2) Storage Area
3) LPG & Diesel station
4) Cooling - & Industrial water
5) Compressor room
6) Generator room
7) Electricity control room
8) Rain water basin
9) Office Building
10) Gate house
11) Fire fighting building
12) Parking area
13) Raw material treatment

LAYOUT & SITE 2D – Process flow sheet



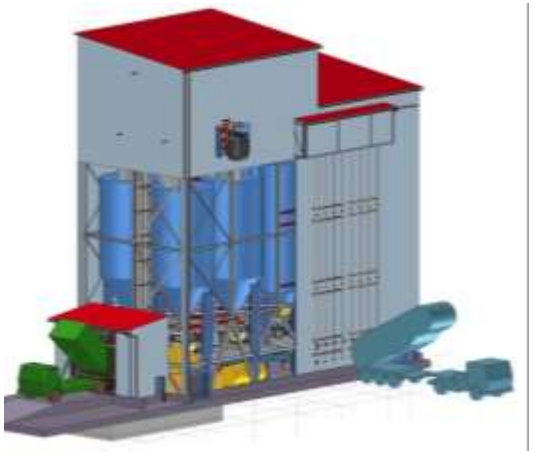
LAYOUT & SITE 2D – *Production building Level 0*



BATCH PLANT

The batch plant is designed for the reception, storage, dosing, weighing and mixing of the raw materials. It is configured exactly to the tonnage of the furnace for the two production lines. The batch plant can divided into 3 parts:

- Raw materiel feeding and storage
- Weighing and mixing
- Cullet return



Raw materiel feeding and storage

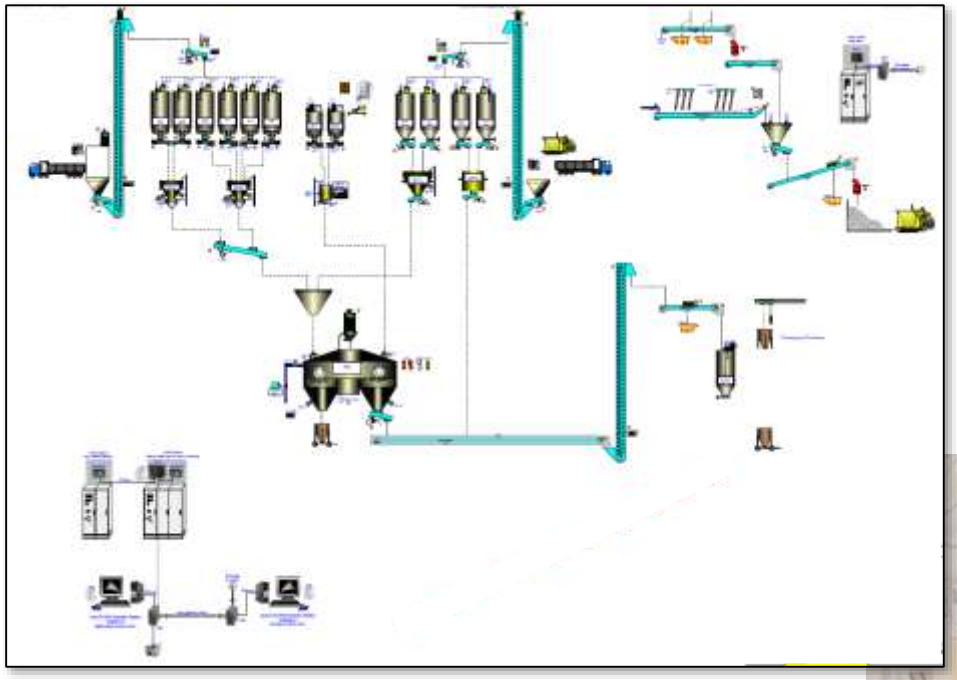
The Raw materials will be stored in the allocated Silos. For a soda-lime glass type there will be 12 batch silos. The Silos are equipped with automatic filling level sensors to ensure, that there are enough raw materials at anytime.

BATCH PLANT

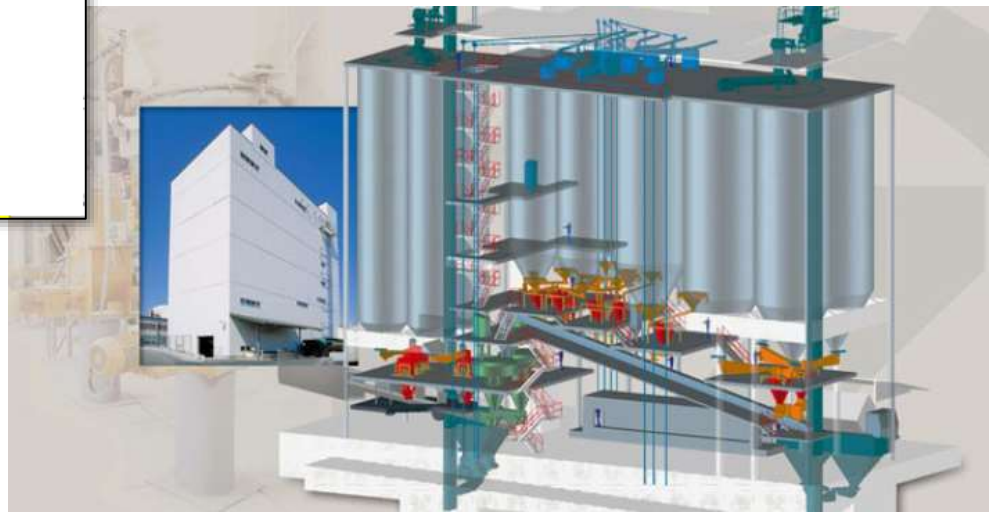
Dosing, Weighing, Mixing & Controlling

The weighing process takes place in full automatic container scales. To reach the exact weights all installed scales are high- precision scales. The weighing accuracy is smaller or equal 0,05% and the dosing accuracy is smaller or equal 0,1%. This facts ensures a perfectly matched batch composition. The raw materials will be transported after scaling through vibration scales to the mixing unit. The task of the unit is to mix the weighed raw materials to a homogeneous batch. The usable volume of these high performance mixer is ca. 750l. Thus, batches can be mixed up to 1000kg.

BATCH PLANT

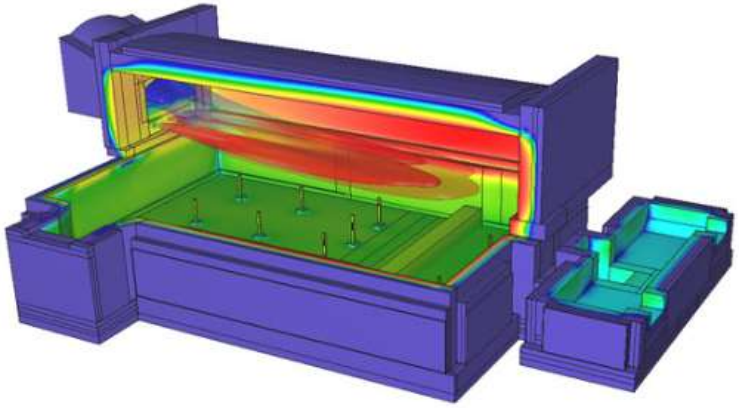


DESCRIPTION	UNIT	VALUE
GLASS TYPE	[type]	Soda-Lime
INTERNAL CULLETS	[%]	ca. 13
MIN REQUIRED BATCH	[t/d]	121,80
MELTING LOSS	[%]	ca. 18
MIN BATCH PLANT CAPACITY	[t/p]	148,54
NO. OF BATCH SILOS	[pcs]	12
BATCH PLANT OPERATING TIME	[h]	16
MIXING CYCLES	[pcs/h]	11
BATCH VOLUME PER CYCLE	[l]	626
NECESSARY BATCH PER HOUR	[kg/h]	9.284



FURNACE AND FOREHEARTH

The furnace will be a regenerative end port fired, deep refiner with a max. capacity of 140t per day. The main fuel type is LPG. The raw material mixture, which are produced in the batch system, will be molten in the furnace. The both regeneration chambers, through which the hot exhaust gasses flow, act as a heat exchanger. The Furnace is specially designed to the requirements of the project to obtain the best configuration regarding the production plan. It will be built with special refractory material and bricks. The furnace is one of the most important and cost- intensive system of the glass plant. Therefore it is very important to have the best quality of material and know how of the supplier to engineer and build these complex system.



FURNACE AND FOREHEARTH

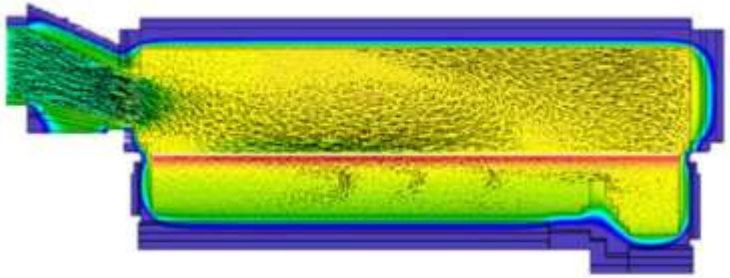
Batch charging

The finished batch composition will be charged from the silos into the furnace. A level control in the melting tank ensures that there is no high variation of the glass level. The charging process is continuously to keep the pressure at the outlets of the production

Batch melting

The Batch will be molten with several burners. Inside the Furnace the temperature is up to 1.600° C. The LPG and air will be fed separately to the burners and mixed in the combustion chamber of the furnace. The molten glass contains a lot of bubbles, which have a negative influence of the production process.

FURNACE AND FOREHEARTH

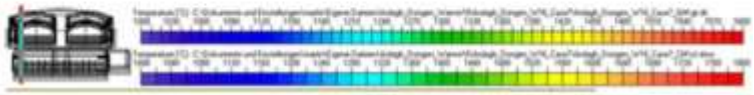


Purification

A wall inside the furnace separates the melting area from the purification area of the melting tank. The wall is ca. have the size of

the molten glass level. By addition of purification substances and the dwell time inside the purification area most of the bubbles

should be eliminated to a minimum.



Feeding

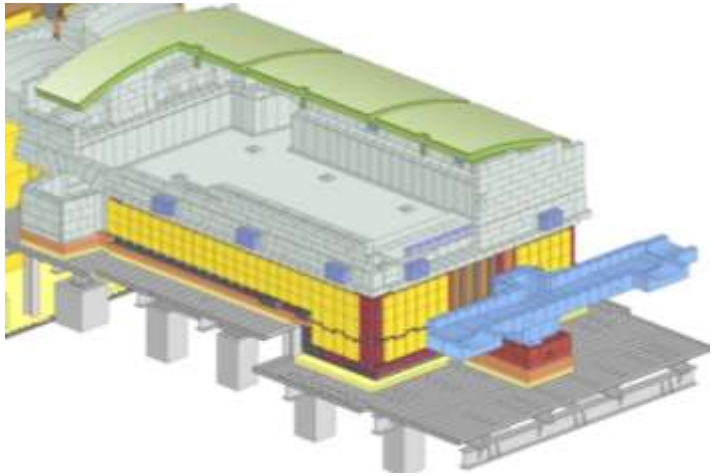
After melting, the glass will be directed to the feeder and the extraction points. It is important to make sure, that the glass is

slowly and evenly cooled down to the required production temperature, to prevent flows of different temperatures. The cooling of

the molten glass in the feeder channels will be managed by air cooled electrodes.

FURNACE AND FOREHEARTH

DESCRIPTION	UNIT	VALUE
FURNACE TYPE		Regenerative end port fired,
FURNACE CAPACITY	[t/d]	140
MELTING SIZE	[m³]	50
NO. OF BURNERS	[pcs]	2
FUEL TYPES	[type]	LPG
MELTER BOOSTING (option)	[kVA]	1.000
GLASS LEVEL CONTROL	[type]	1 contact less
BUBBLING WALLS	[pcs]	1



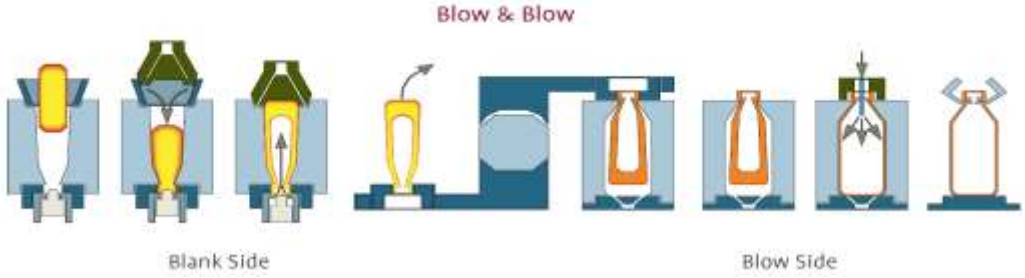
IS MACHINES

The molten Glass will be spread by the gob distributor into the IS machines. For 140t glass per day there are 2 IS machines from type double gob 5 ½“ planned. Each machine is designed for 8 sections so it is possible to handle 16 gobs per cycle per machine. The performance strongly depend on the quality of the IS machines and the homogeneity of the molten glass. For the forming process, there are different forming methods to produce the several bottle types. In this project the „Blow & Blow“ and the, „Press & Blow“ process are the most important methods. A distinction is generally made between the pre-mould (blank side) and finished mould (blow side).

IS MACHINES

Blow & Blow.

During the Blow & Blow process the glass is directed first into the preform. Air will be blown from the bottom into the mould, so that the still hot glass will be pressed into the mould. In a second step, the preformed bottle is placed in the finished mould.
The air is now blowing from the top into the mould and the glass will be pressed into the finished form and the bottle gets its final form.

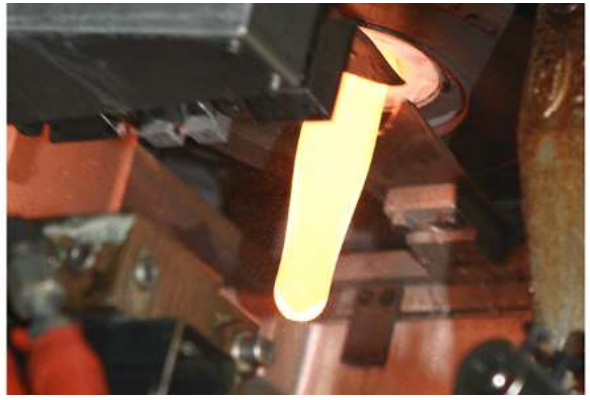


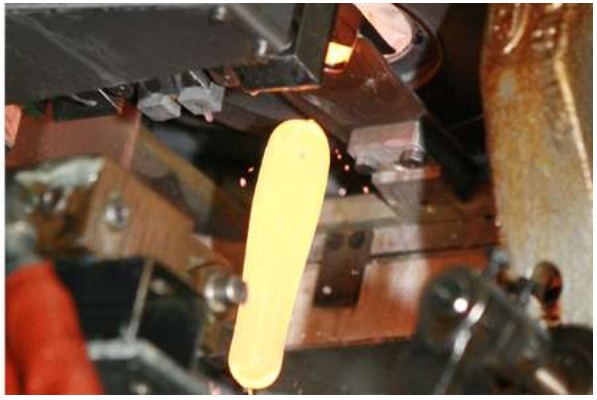
Press & Blow

This method is similar to the Blow & Blow method. The difference is that on the blank side no air will be blown into the pre-form, but the hot glass will be pressed with a plunger from the bottom into the form.
The next step is identical to the Blow & Blow method. The pre-formed bottle is placed on the blow side in the finished form and will be pressed with compressed air from the top into the form.

IS MACHINES

DESCRIPTION	UNIT	VALUE
MACHINE TYPE	[type]	IS8 DG 5 ½“
NUMBER OF SECTIONS	pcs	8
NUMBER OF CAVITIES	pcs	2 per section
TOTAL CAVITIES	pcs	16
TYPICAL BOTTLE WEIGHT	g	220 / 400
FORMING TIME	s	6,00 / 8,57
BOTTLES PER DAY	pcs	230.400 / 161.280
FORMING PROCESS	[type]	bb / pb / nnpb
MOULD COOLING TYPE	[type]	verti flow





ANNEALING LEHR

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The settings of the machine must be re-adjusted for each new glass amount and article type. After the bottles were cooled down, they are sprayed at the outlet of the annealing lehr with a special liquid. This cold-end coating is used in order to protect the glass surface from scratches, during the further processing and handling. The bottles have at this point a temperature of about 80 to 120° C.

ANNEALING LEHR

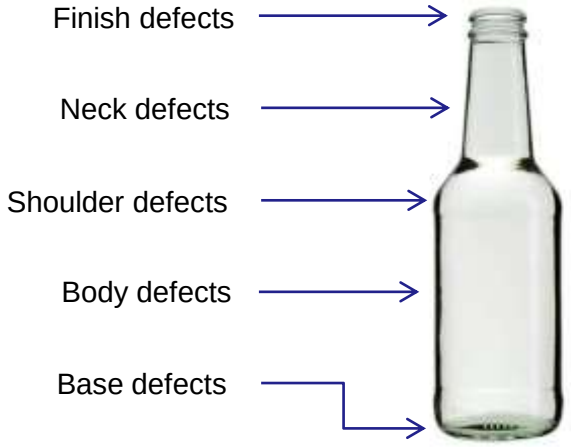
ANNEALING LEHR	UNIT	VALUE
conveyor width	[mm]	3.000
free inside height	[mm]	400
lehr total length	[mm]	24.800
no of burner	[pcs]	8
no of circulation fans	[pcs]	17
no of exhaust fans	[pcs]	1
no of cooling bridges	[pcs]	1
cold end coating bridge over belt	[pcs]	1
cold end coating bridge under belt	[pcs]	1
cold end coating dosing cabinet	[pcs]	1

INSPECTION MACHINES

The finished products will be tested in the ongoing process to various errors, such as bubbles, forming failures, wall thickness etc. Faulty bottles will be immediately ejected and discarded and transported via the cullet conveying system back to the cullet silo and be molten again. The inspection machines are adapted to the required quality of the finished products and the requirements of the customer. Therefore it is possible to adjust the inspection machine individually so that either selected stronger or weaker, depending on the requirements. Due to the ongoing control, the needed quality of the bottles is guaranteed.

Flexinspection M

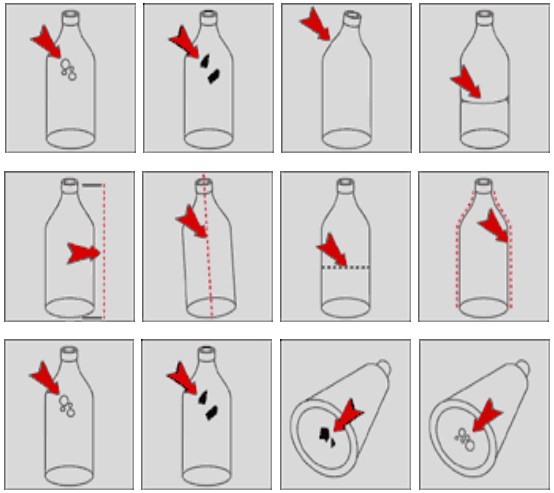
The Flexinspection M is a rotary inspection system. It includes both the inspection machine and an integrated conveyor system. The Flexinspection M is equipped with a star wheel. This is a rotating unit, which is provided with individual bags. The machine is able to check the finish, neck, shoulder, body and base of the bottle. The failures which will be detect are cracks, dimensional errors, forming failures etc..

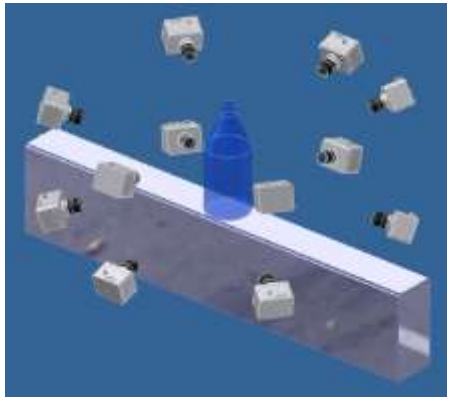


INSPECTION MACHINES

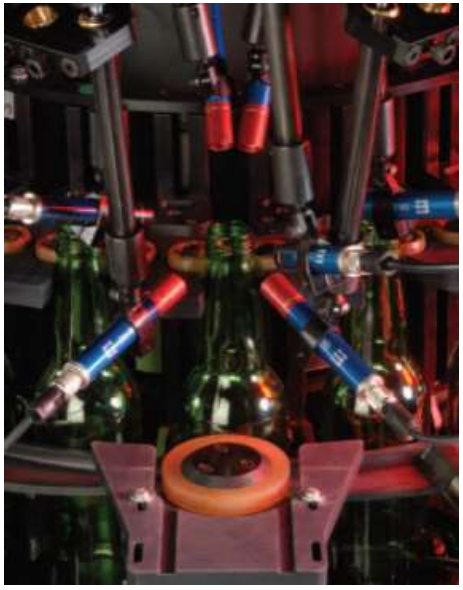
Flexinspection C

The Flexinspection C is a configurable inspection system that provides non contact sidewall inspections. It is able to capture up to 24 individual views of the sidewall for each container. With several cameras it is possible to have an full 360° angle to detect bubbles, inclusions, tension stress and dimensional failures. Depending on the size of the bottle, the flexinspection C can reach a max. speed of 600 bottles per minute. In addition to a preferably optimal production performance, an authentic detection of defects is very important! On the one hand, due to increasing production speeds, the risk to overlook a defect grows. On the other hand, the customers claim for quality became more and more ambitious the last years.





INSPECTION MACHINES



INSPECTION MACHINES	UNIT	VALUE	
camera inspection	[mm]	height: 38-381, diameter: 16-170	
vision plug/ring/dip/saddle			
sidewall	[type]	stress	
shoulder	[type]	stress	
base	[type]	transparency, stress, mould code reader-DOT or digital	
star wheel inspection	[type]	round: 50 to 84	round: 50 to 84
	[type]	unround: no	unround: no
star cavities	[pcs]	24 or 18	24 or 18
finish	[type]	check, crack, height-inside outside gauging, LOF	
body	[type]	check, crack, wall thickness, ovality	
bottom	[type]	check, crack, mould code reader-DOT or digital	
configuration concept 1	[pcs]	1	1
configuration concept 2	[pcs]	2	2

<u>European Technologies</u>

- Highest requirements (quality standards) of the customer
- European quality standards of the equipment
- Due to this fact Bralico and Braso actual buy bottles from Germany

CONVEYING AND PACKAGING

After passing all inspections and checks, the bottles will be prepared for the packaging. With special conveying belts the bottles will be transported through the whole cold end area. To compensate waiting times because of defects or accidents in the cold end area, there are extra storage tables. With these tables it is possible to store the bottles for a certain time. Due to that a continuous flow of bottles is given. At the palletizer the bottles will be accumulated on a separate table and lined up for the packaging. On an empty pallet a carton layer is placed on which the first bottles are loaded. After that, the next carton layer and bottles will be placed on top. This process is repeated several times. The full loaded pallet will be conveyed to the shrinking machine where it is wrapped and shrinked with a plastic foil. On the one hand the shrinking process protects the glass for environmental influences and on the other hand it enables a stable and secure transport.

CONVEYING AND PACKAGING

PALLETIZING MACHINES	UNIT	VALUE
pallet size	[mm]	1200x1000
pallet weight minimum	[kg]	300
pallet weight maximum	[kg]	1500
pallet height minimum	[mm]	500
pallet height maximum	[mm]	2400
conveying speed	[m/min]	6-12
bottom film	[yes/no]	no
layers (Bottom layer, intermediate layer, top layer)	[type]	plastic or carton
packaging	[type]	LPG shrinker with foil magazin
speed shrinking line	[pallets /h]	ca. 25

MEDIA SUPPLY – COMPRESSED AIR

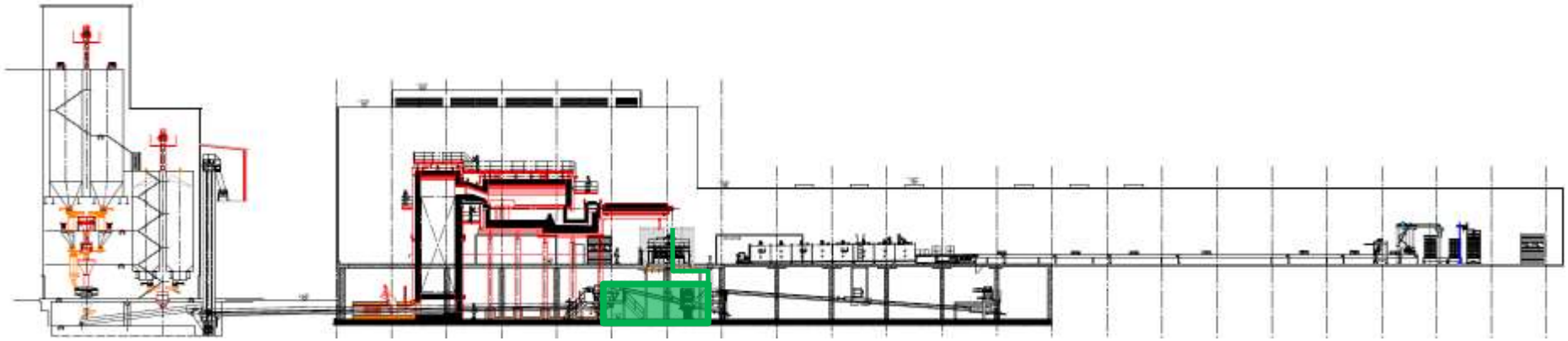
CONSUMER	TYPE OF DEMAND	CONSUMPTION [Nm³/min]
BATCH PLANT	CONTROL AIR / FEEDING SILOS WITH RAW MATERIALS	HIGH 1,7
FURNACE+ FEEDER	CONTROL AIR / COOLING BURNERS, FURNACE CAM UND FEEDER EQUIPMENT	HIGH 13,43 / LOW 13,86
IS MASCHINE	CONTROL AIR/ COOLING / FROMING PROCESS	HIGH 10,59 / LOW 101,6
COLD END COATING	AUTOMIZAZION FOR COLD END COATING	HIGH 2,0
COLD END CONVEYING	CONTROL AIR / EJECTION OF BOTTLES	HIGH 0,2
QUALITY INSPECTION	EJECTION OF DEFECT BOTTLES	HIGH 4,4
PACKAGING	CONTROL AIR	HIGH 3,1

BATCH PLANT ***FUNRACE + FEEDER*** ***IS MACHINES*** ***COLD END COATING*** ***QUALITY INSPECTION*** ***PALLETIZER + PACKAGING***

MEDIA SUPPLY – COMPRESSED AIR

MEDIA SUPPLY – VACUUM + COOLING AIR

CONSUMER	TYPE OF DEMAND	CONSUMPTION [Nm³/min]
IS MASCHINE	SUPPLY OF THE FORMING PROCESS, BLEEDING OF THE MOULDS	8,0 (VAKUUM)
IS MACHINE	COOLING	1.034,00 (COOLING AIR)

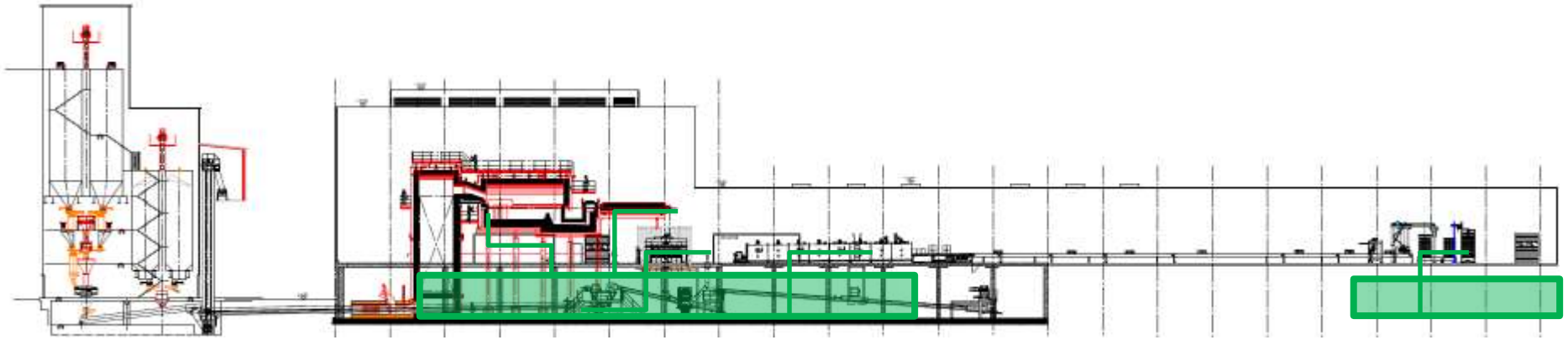


IS MACHINES

MEDIA SUPPLY – VACUUM + COOLING AIR

MEDIA SUPPLY – LPG

CONSUMER	TYPE OF DEMAND	CONSUMPTION [Nm³/min]
FURNACE + FEDDER	MELTING PROCESS	355
HOT END	HEATING / PREHEATING OF MOULDS AND MACHINE BELTS	10
ANNEALING LEHR	HEATING	50
PACKAGING	PACKAGING OF PALETTS WITH SHRINKING FOIL	8



MEDIA SUPPLY – LPG

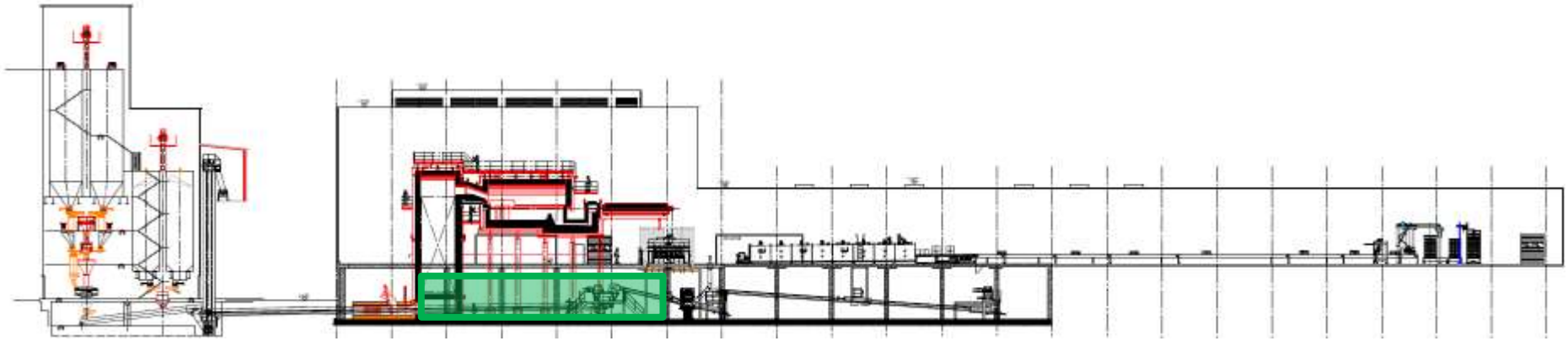
Turnaround of the refinery, 45 days

- 45 days supply stop of LPG, because of the turnaround
- During these 45 days the furnace is working with diesel, all other LPG consumers still running with LPG
- 45 days LPG storage for the production (excl. Furnace)

The LPG is planned with 4 tanks, each with a storage volume of at least 200 m³ (110 tones LPG). This is conform to a commissioning time of 45 days

MEDIA SUPPLY – DIESEL

CONSUMER	TYPE OF DEMAND	CONSUMPTION [l/h]
FURNACE + FEDDER	MELTING PROCESS	850
GENERATORS	ELECTRICITY	530



FUNRACE + FEEDER

MEDIA SUPPLY – DIESEL

Power supply system 50% - Diesel generators 50%

- Unstable power supply in Congo
- 50% electricity network, 50% Diesel tanks to avoid oversizing of the diesel tanks
- Commissioning time 7 days

Heating of the furnace during turnaround

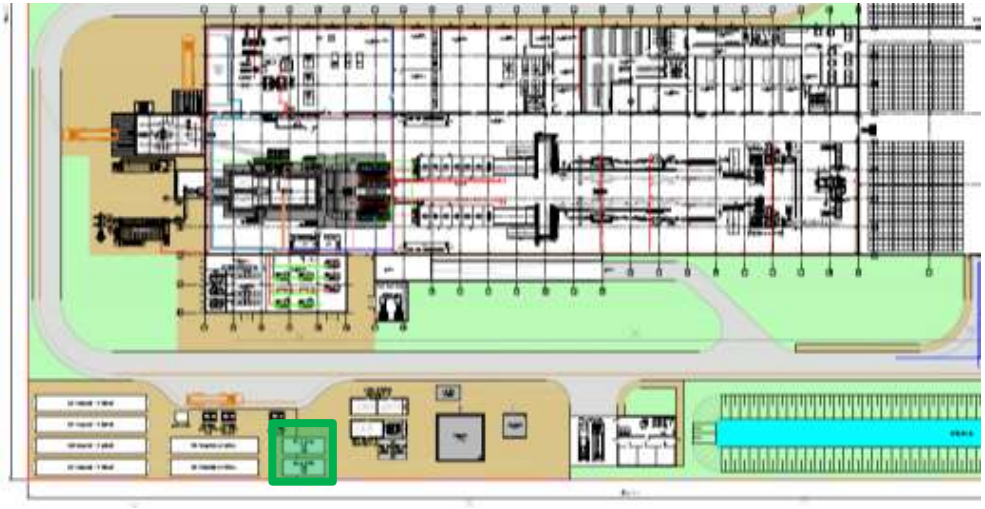
- unlimited supply of diesel during the turnaround
- firing of the furnace with diesel all other consumers with LPG

Diesel demand for 7 days commissioning time

- furnace demand 850 l/h
- electricity generators 503 l/h (50% Diesel)

→ ca. 32.500 l /day

→ ca. 230.000 for 7days



MEDIA SUPPLY – ELECTRICITY (DIESEL GENERATOR)

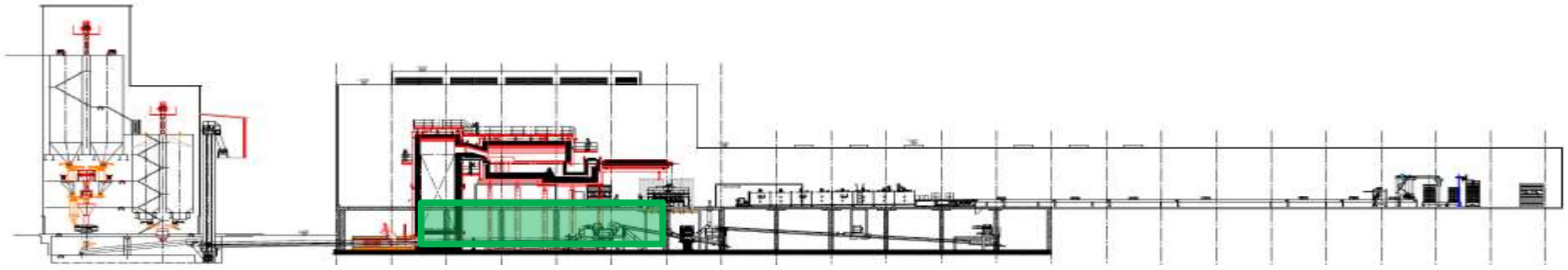
Because of the unstable electrical situation, it is necessary to plan with an alternative electrical supply. It will be realized with Diesel Generators. Therewith it is possible to be independent of the local unstable electricity Network. The whole connection load is approximately 4,3 MW. All Diesel Tanks are designed to supply the Generators with enough diesel for a min. of 7days commissioning time. The plan is to provide the whole plant (excl. Furnace) with 50% from the Generators and 50 from the local electricity network

POWER BALANCE

CONSUMER	CONNECTION LOAD [kW]	CONSUMPTION LOAD [kW]
BATCH PLANT	ca. 435	ca. 275
FURNACE + EXHAUST	ca. 1.100	ca. 691
IS MACHINES + COOLING AIR	ca. 804	ca. 507
ANNEALING LEHR + HE COATING	ca. 263	ca. 165
CE LINE (CONVEYING, PACKAGING, PALLETIZING)	ca. 307	ca. 193
COMPRESSED AIR HIGH / LOW	ca. 1.635	ca. 1030
VACUUM	ca. 365	ca. 229
WATER SYSTEMS	ca. 498	ca. 313
SUB DISTRIBUTION (TGA): OFFICE AND STUFF BUILDING, WORKSHOPS, SORAGE + OUTDOOR, CE + HE, LABORATORY	ca. 843	ca. 531,5
SUM	**ca. 6.250**	**ca. 3.937,5**

MEDIA SUPPLY – COOLING WATER

CONSUMER	TYPE OF DEMAND	CONSUMPTION [Nm³/h]
PROCESS TECHNIC	FURNACE ELECTRODES, STACKER, FEEDER MACHINE, IS MACHINE, CROSS CONVEYOR	11,8
UTILITY TECHNIC	COMPRESSED AIR, VACUUM	199,5

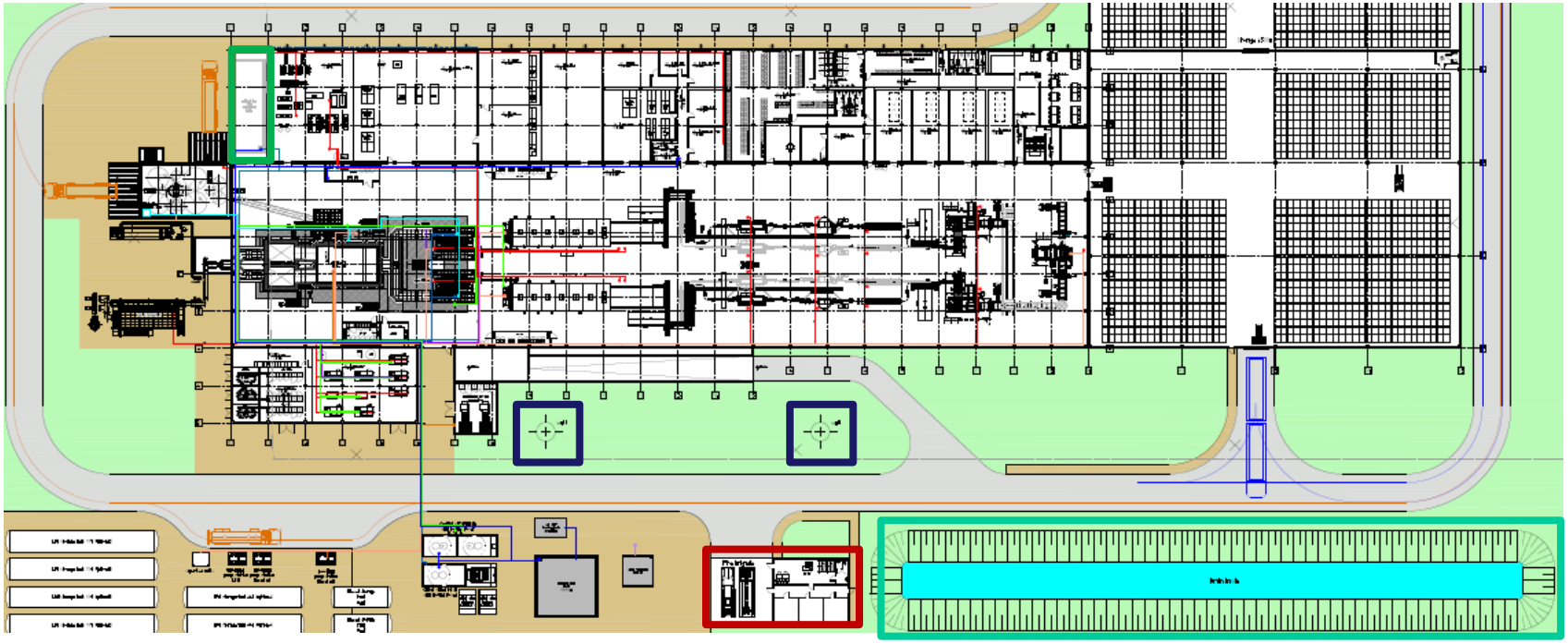


FUNRACE + FEEDER +STACKER, FEEDER MACHINE, IS MACHINE, CROSS CONVEYOR

MEDIA SUPPLY – COOLING WATER

FIRE-FIGHTING WATER

CONSUMER	TYPE OF DEMAND
PRODUCTION PLANT	FIREFIGHTING IN CASE OF EMERGENCY



WATER BASIN

WELLS

FIRE DEPARTMENT

WATER DRAIN BASIN

Fluid Balance

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/min]
COMPRESSED AIR LOW	FURNACE	12,86
	FEDDER	1,0
	IS MACHINES	101,6
	SUM	**115,46**

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/min]
COMPRESSED AIR HIGH	BATCH PLANT	1,7
	FURNACE	13,43
	COLD END COATING	2,0
	SINGLE LINE	0,2
	IS MACHINES	10,59
	INSPECTION MACHINES	4,4
	PACKAGING AND PALLATIZING	3,1
	WORKSHOPS, LABORATORIES, UTILITIES	3,0
	SUM	38,42

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/min]
VACUUM	IS MACHINES	8,0
	SUM	**8,0**

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/min]
IS COOLING AIR	IS MACHINES	1.034,0
	SUM	**1.034,0**

Fluid Balance

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/h]
WELL WATER (INDUSTRIAL WATER)	BATCH PLANT	0,30
	CULLET COOLING	1,5
	COOLING WATER	5,8
	POTABLE WATER	1,0
	EMERGENCY WATER	5,0
	FIRE WATER	10,0
	TREATMENT WATER	1,2
	SUM	**24,8**

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/h)
CULLET WATER	SCRAPPER	30,0
	SUM	**30,0**

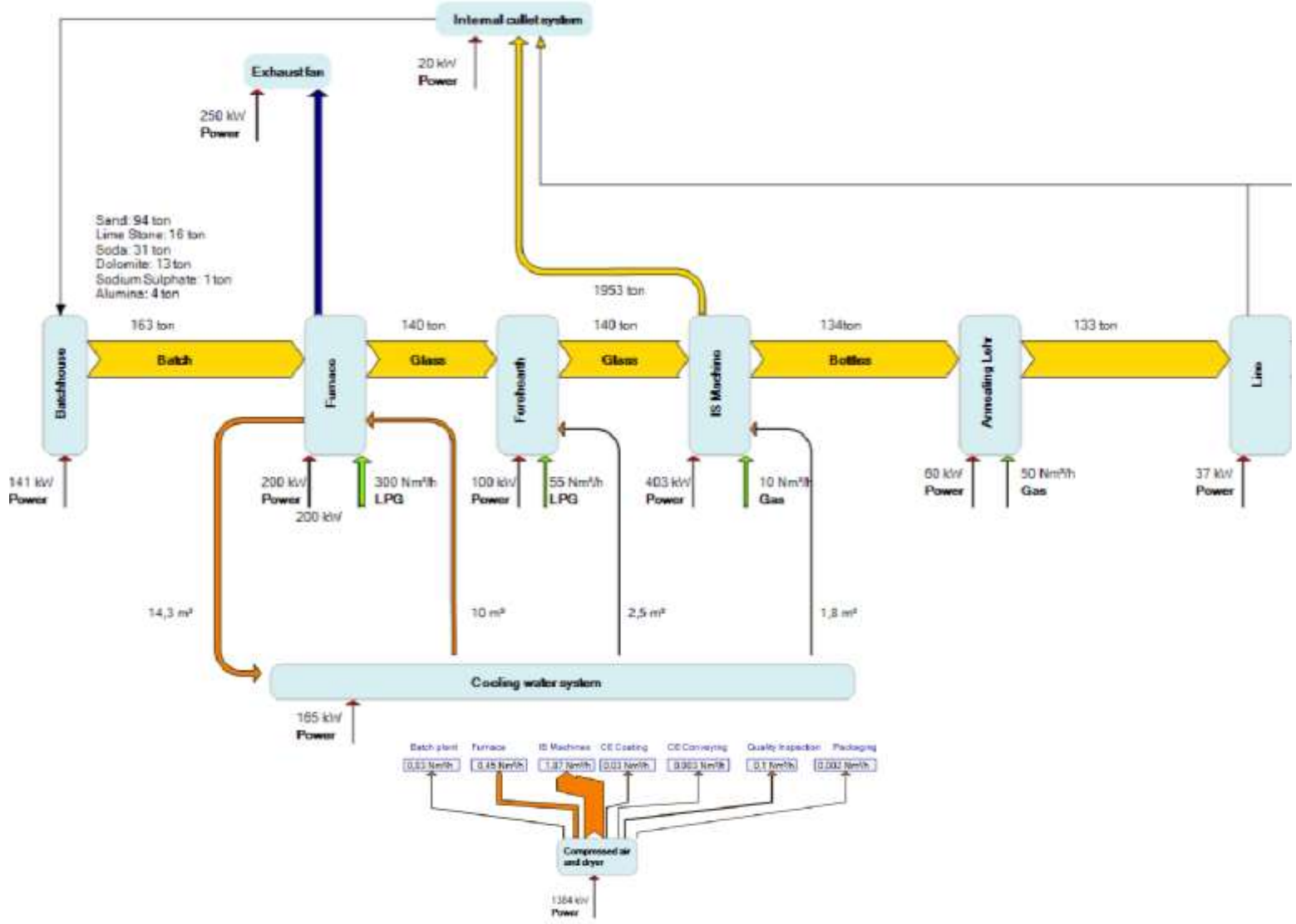
Fluid Balance

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/h]
COOLING WARER	FURNACE 6 FOREHEARTH	10,0
	IS MACHINE	1,8
	COMPRESSED AIR	166,5
	VACUUM	22,0
	SUM	**200,3**

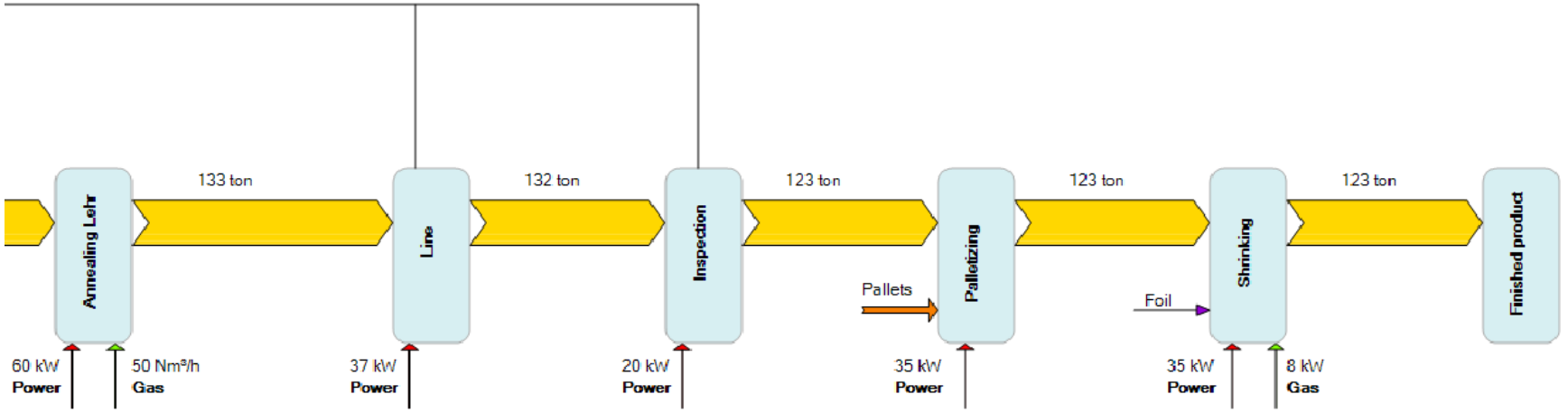
MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/h)
EMERGENCY WATER	FURNACE	10,0
	SCRAPPER	30,0
	SUM	**40,0**

MEDIA SUPPLY	CONSUMER	CONSUMPTION [Nm³/h)
SOFT 6 OSMOSIS WATER	SHEAR SPRAY	0,1
	SCRAPPER	0,2
	SUM	**0,3**

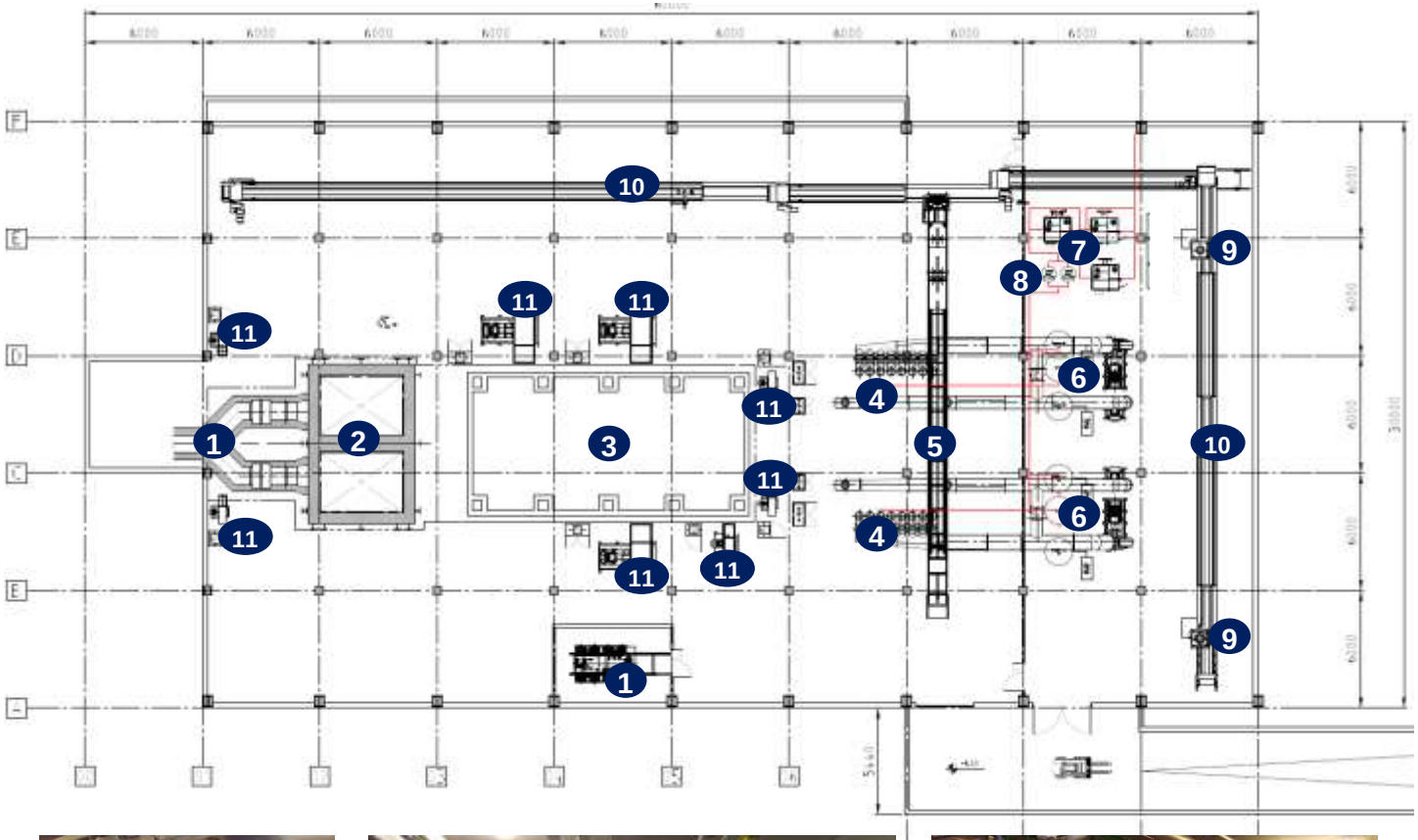
LAYOUT & SITE 2D – *Process flow diagram*



LAYOUT & SITE 2D – *Process flow diagram*

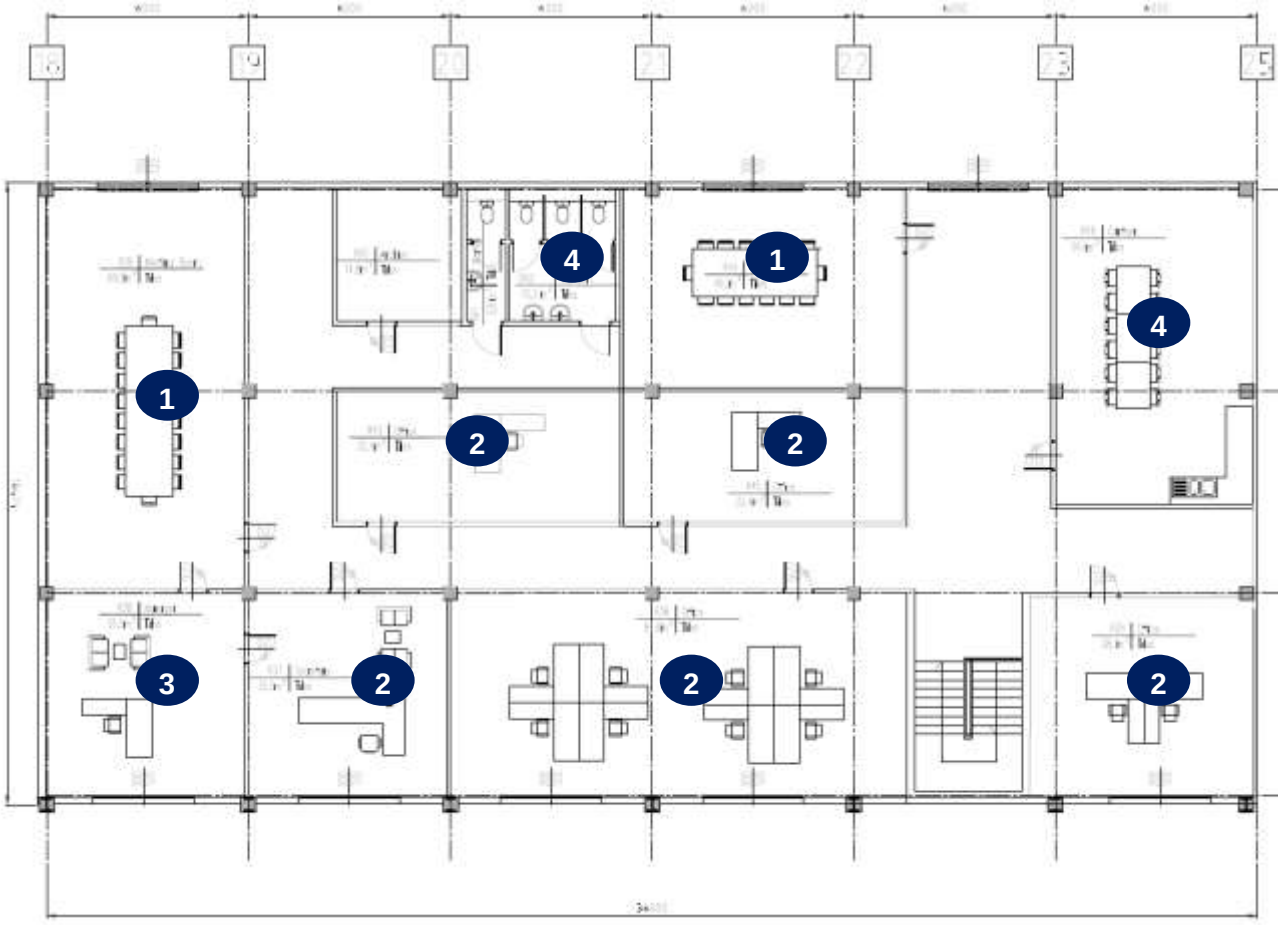


LAYOUT & SITE 2D – Production building Level -6



1) Flue gas channel
2) Regenerator
3) Drip pan
4) IS Cooling air ducting
5) Scrapper
6) Compressed Air & Vacuum vessels
7) Vacuum pumps
8) Vacuum filter
9) Cullet chutes
10) Cullet conveyors
11) Fans

LAYOUT & SITE 2D – *Production building Level +4*



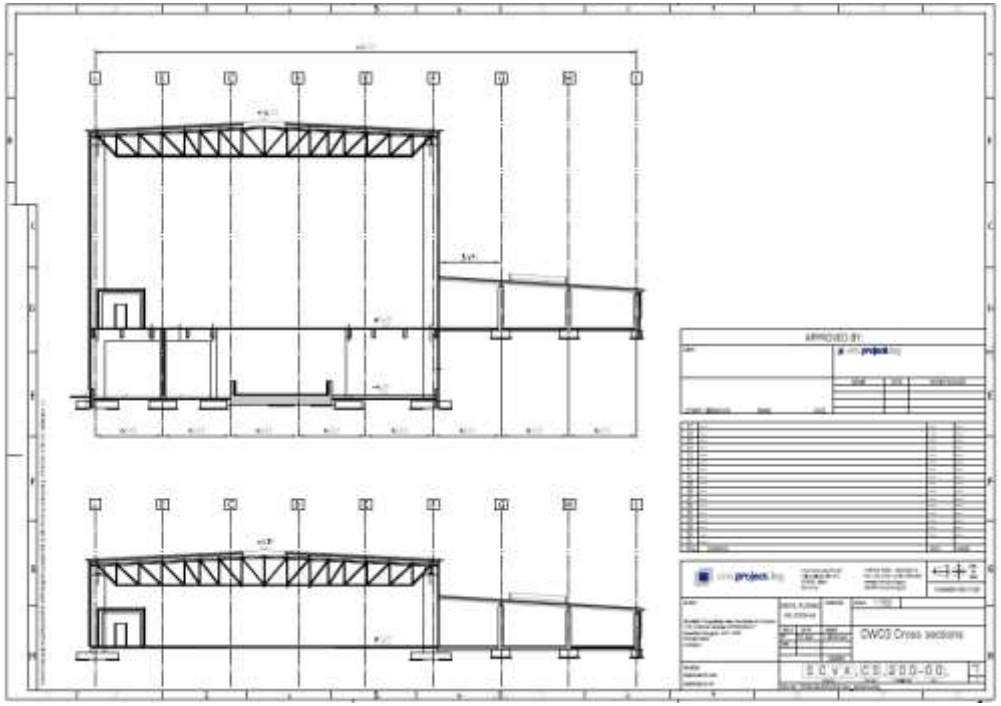
1) Meeting rooms

2) Offices

3) Manager room

4) Canteen

PRODUCTION BUILDING



Production hall.

Length: 138,00 m
Width: 30,00 m
Height: 18,00 m and 8,65 m
Storeys: 3
Area: 4140 m²
Volume: 34200 m3

Social – Technical part.

Length: 138,00 m
Width: 18,00 m
Height: 8,00m
Storeys: 2
Area: 3111 m²
Volume: 9173 m3

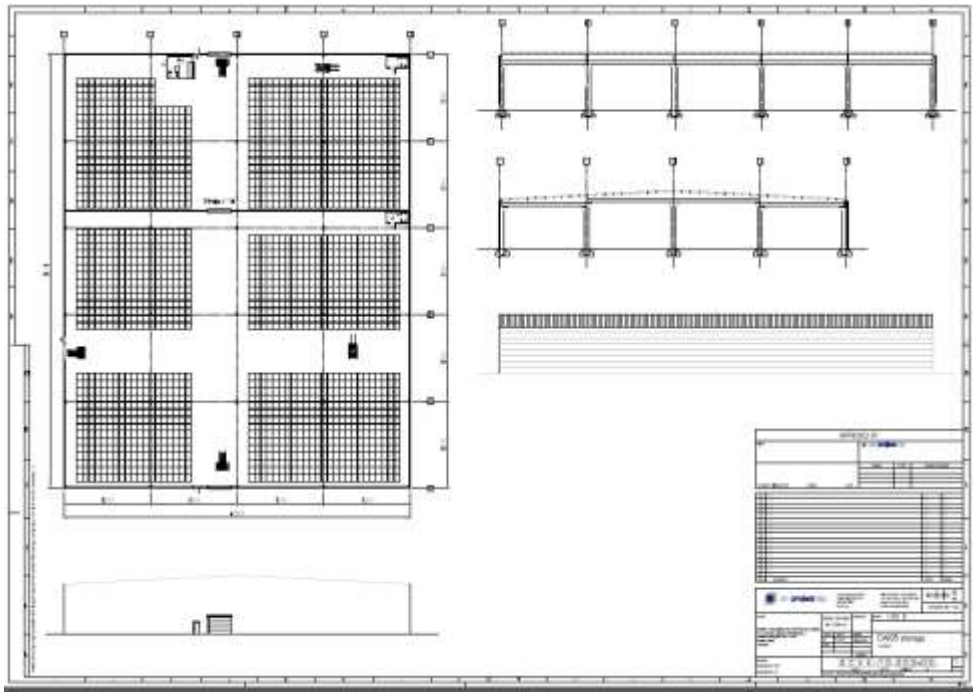
Material Solution:

- Foundation beams, Reinforced concrete foundation
- Steel trusses on concrete pillars spaced every 6.0m span of 30m
- Ceilings - reinforced 20cm thick
- External walls – Steel cassette wall thickness 120mm
- Roof - Trapezoidal sheet, Mineral wool 150kg/m3 , 10cm, Purlins 200, Steel truss
- Floors concrete floor reinforcement 30cm thick cured mechanically

WARE HOUSE

Production hall.

Building height:	10 m
Built-up area:	4200 m2
Area:	4200 m2
Storage area:	4200 m2
Volume:	34200 m3



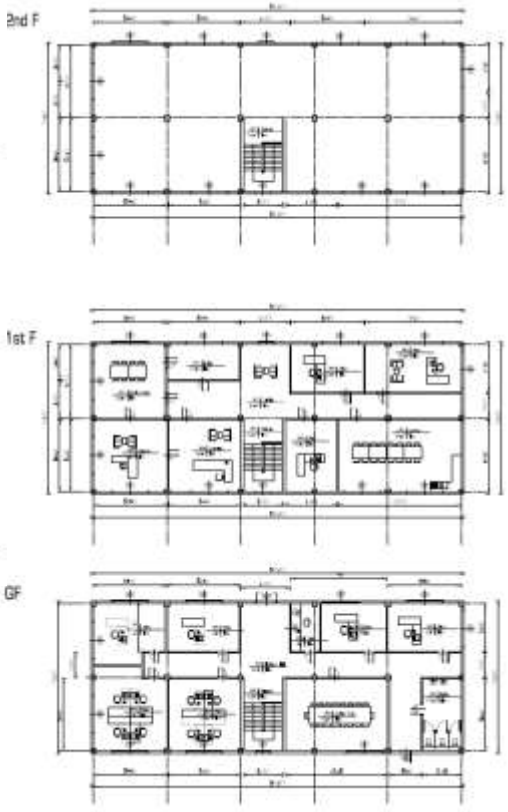
Material Solution:

- Foundations slabs and foots, alloys poured reinforced concrete foundation slabs of wet sited -1.10 m
- External walls - Autoclaved aerated concrete thickness: 24 cm, Plastered façade
- Roof - Membrane roof with PVC, Mineral wool 150kg/m3, thickness 10cm PE02 film - vapor barrier, R15 200 channels, Beam HEA 240 R15, concrete girders
- Floors - Concrete floor with reinforcement 30cm thick, cured mechanically Moisture insulation - PE film, Lean concrete C8/10 - 10cm, Sand bed paved - 20cm

OFFICE BUILDING

Production hall.

Building height:	7,13 m
Built-up area:	376,96 m2
Area:	753,92 m2
Gross Volume:	2601,02 m³
Storeyes:	3



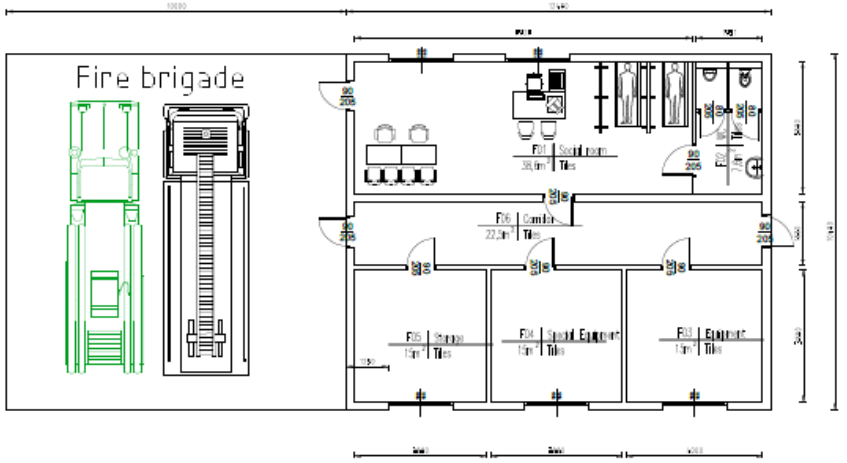
Material Solution:

- Foundations slabs and foots, alloys poured reinforced concrete foundation slabs of wet sited -1.10 m
- External walls - Autoclaved aerated concrete thickness: 24 cm, Mineral wool , thickness 12cm, Air gap of 1.5, Plastered façade
- Roof - Membrane roof with PVC, Mineral wool 150kg/m3, thickness 10cm, PE02 film - vapor barrier, - R15 200 channels, Beam HEA 240 R15
- Internal walls - Construction of aerated concrete masonry thickness 12 cm

FIRE BRIGADE BUILDING

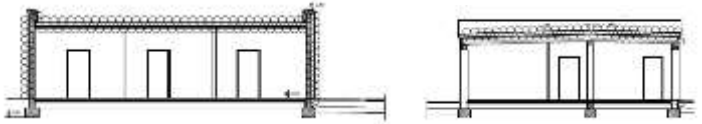
Production hall.

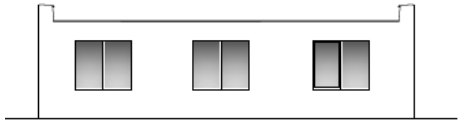
Building height:	3,41 m
Built-up area:	130,80 m2
Area:	130,80 m2
Gross Volume:	425,10 m³
Storeyes:	1

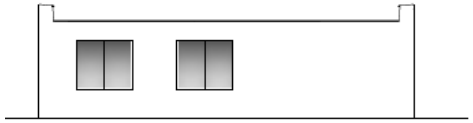


Material Solution:

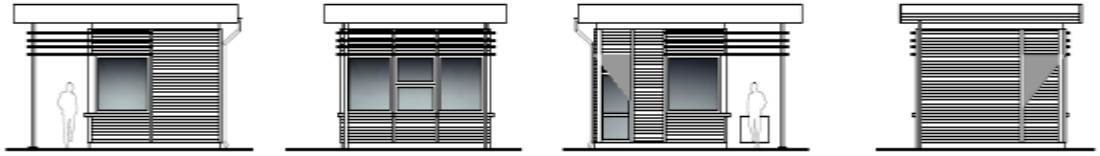
- Foundations slabs and strips, alloys poured reinforced concrete foundation slabs of wet sited
- External walls - Autoclaved aerated concrete thickness: 24 cm, Mineral wool thickness 12cm, Air gap of 1.5, Plastered façade
- Roof - slope inclination - 3 %, Membrane roof with PVCMineral wool 150kg/m3, thickness 10cm, PE02 film, vapor barrierTR trapezoidal sheet, I-joists, steel beams
- Floors - Industrial floor thickness 16cm, Moisture insulation, PE film. Lean concrete C8/10 thickness 10cm
- Internal walls: Autoclaved aerated concrete thickness 24 cm
  Autoclaved aerated concrete thickness 12 cm





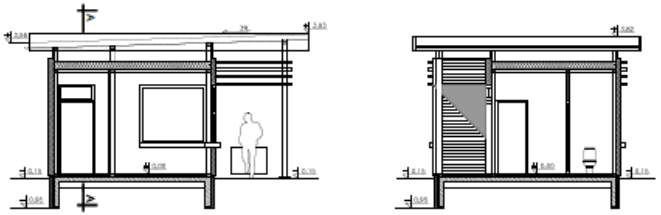


GATEHOUSE BUILDING



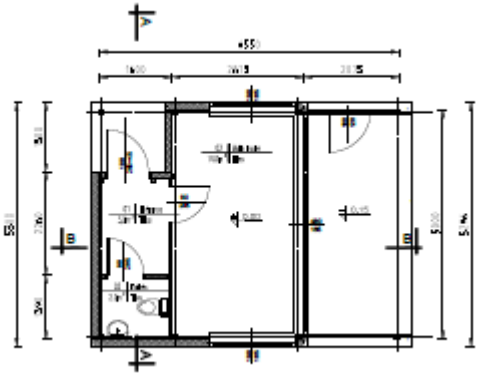
Production hall.

Building height:	3,82 m
Built-up area:	34,66 m2
Area:	19,20 m2
Gross Volume:	136,74 m³
Storeyes:	1



Material Solution:

- The building built on the foundation plate , 10cm thick reinforced concrete, reinforced with rods ø6 , with a mesh 20x20cm , top and bottom . Plate supported on the perimeter foundation walls , concrete 15cm thick . The foundation made of concrete B-15 , wherein the foundation walls 10cm lean concrete B-7
- Posts and beams are designed with hollow sections 100x100x3. The whole structure bolted M-10 , Class 4.8 . Construction concentrated stitches M -10. All steel parts shall be protected with anticorrosive paint
- Internal walls - The walls of sandwich panels filled with mineral wool . 8 cm thick
- External walls - Designed the exterior walls of sandwich panels with mineral wool filling 15cm thick
- Roof - Slope inclination - 3 % , trapezoidal roof covering
- Insulation – mineral wool, polystyrene, polyurethane foam, PVC film flange



LAYOUT & SITE 3D – Site overview

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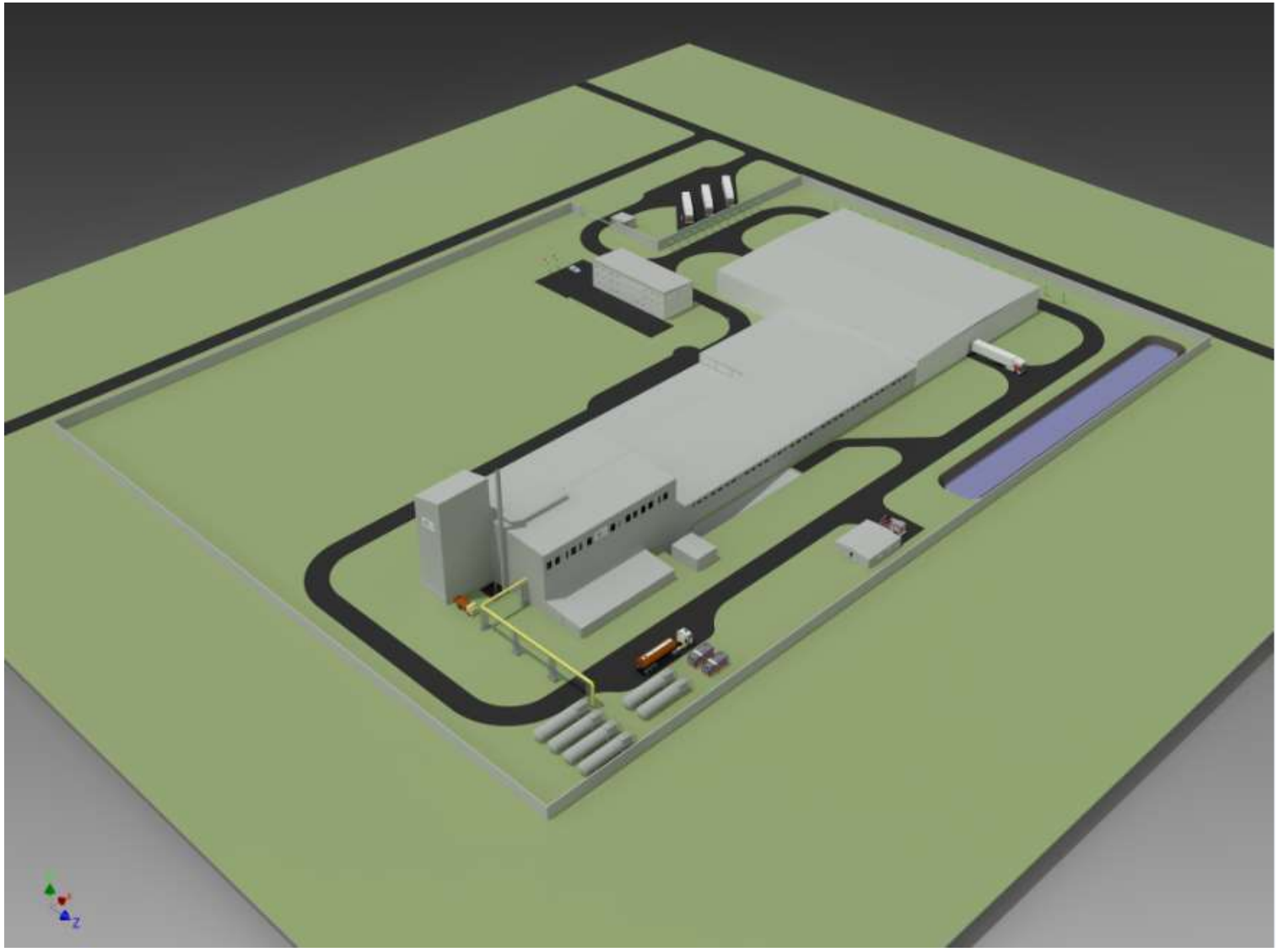
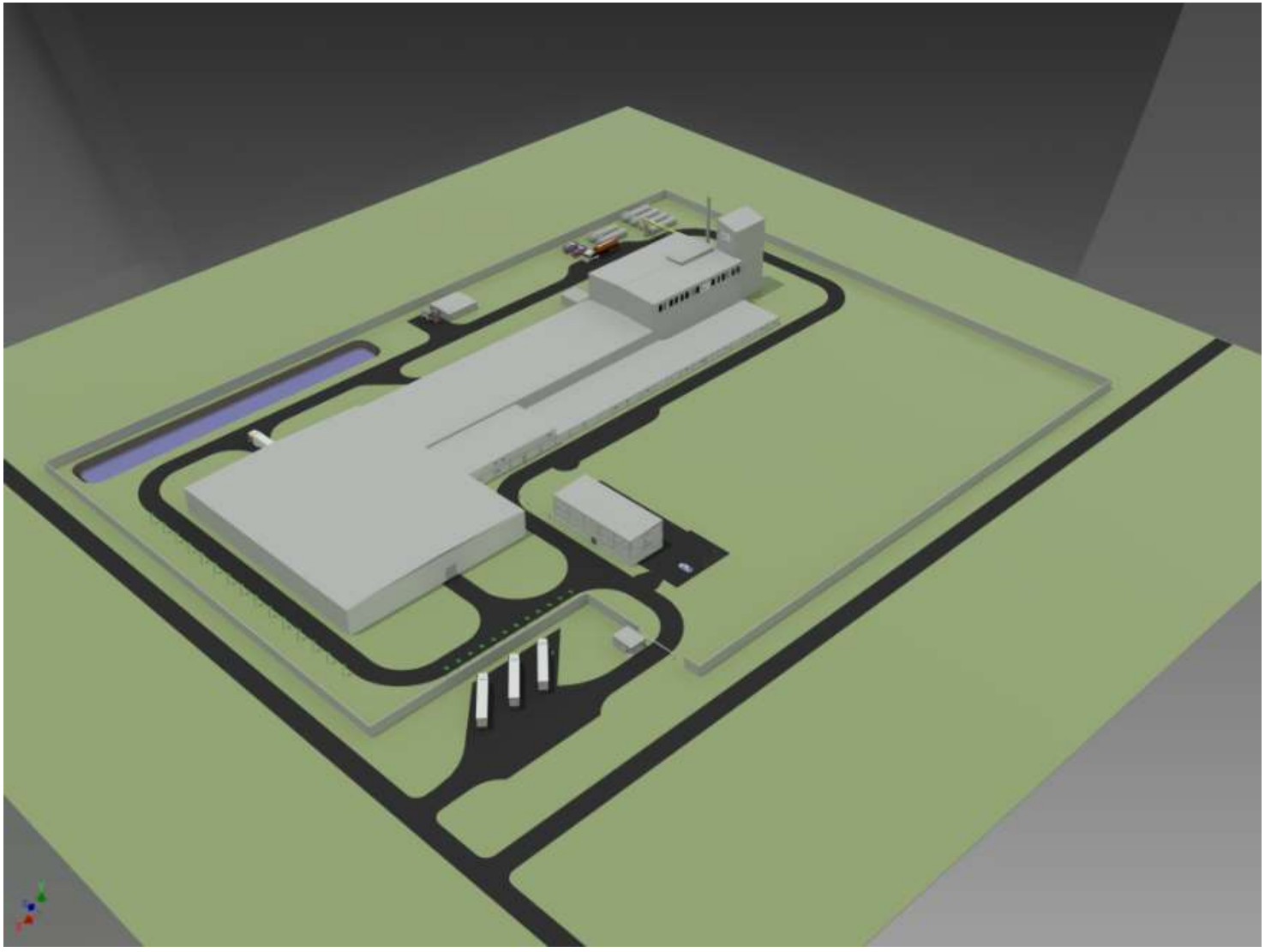
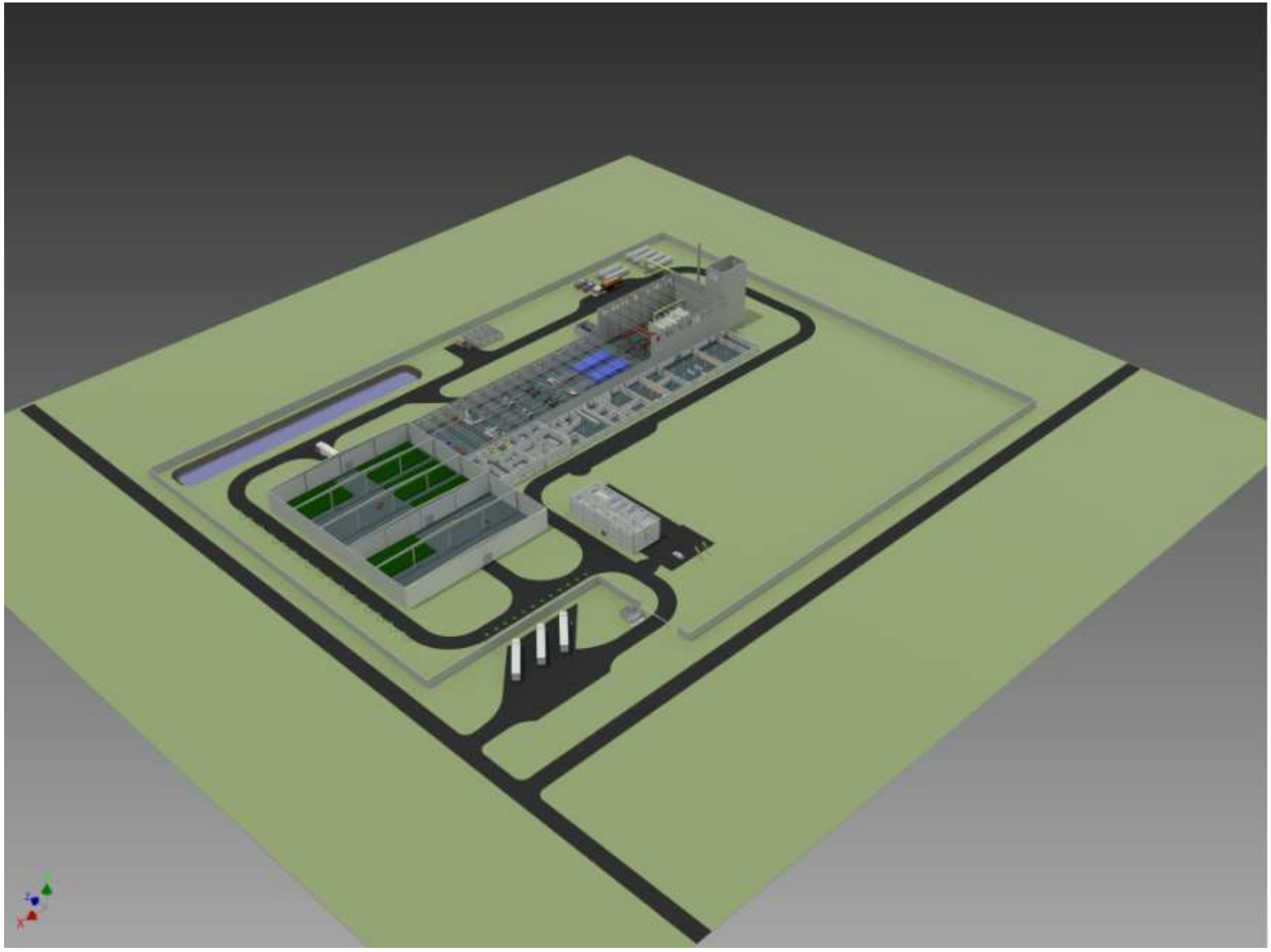


LAYOUT & SITE 3D – Site overview



LAYOUT & SITE 3D – *Site overview*

LAYOUT & SITE 3D – Site overview



LAYOUT & SITE 3D – Site overview

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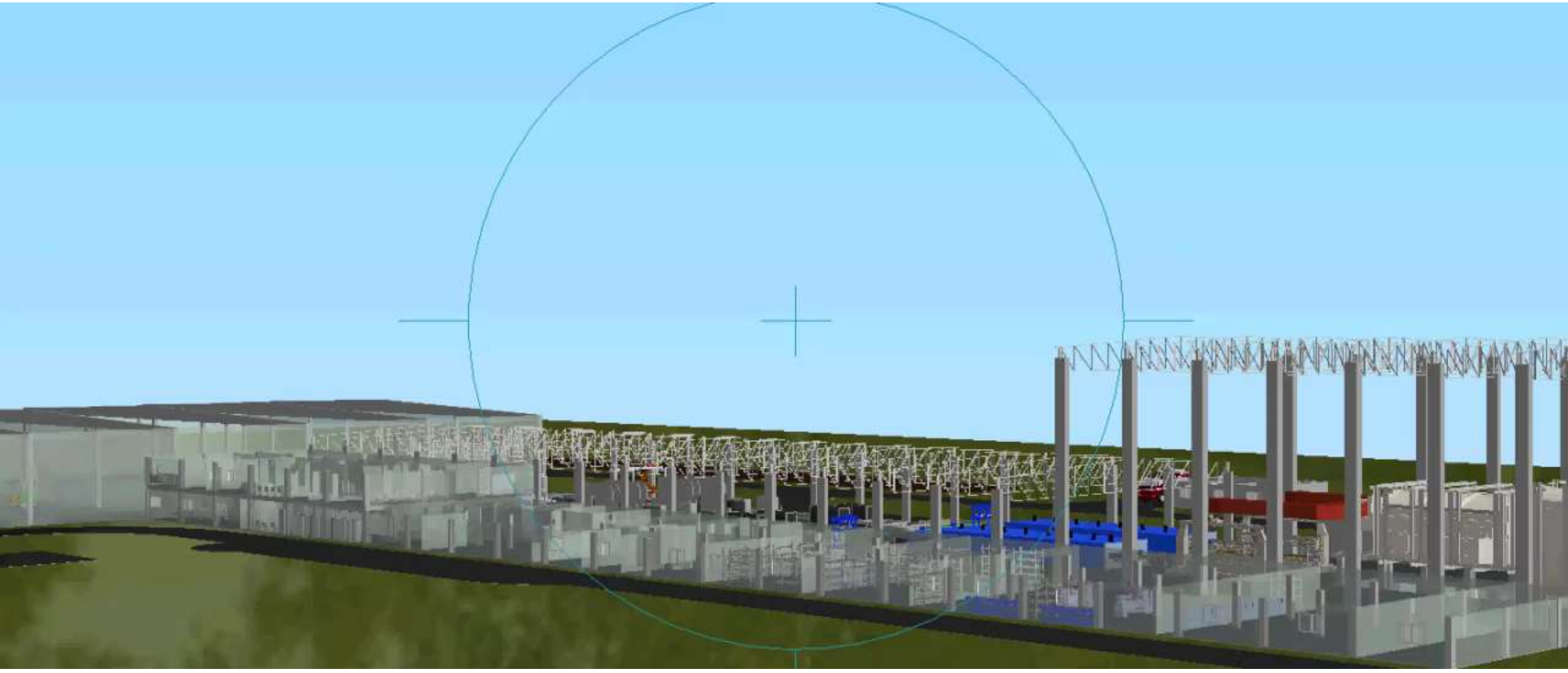
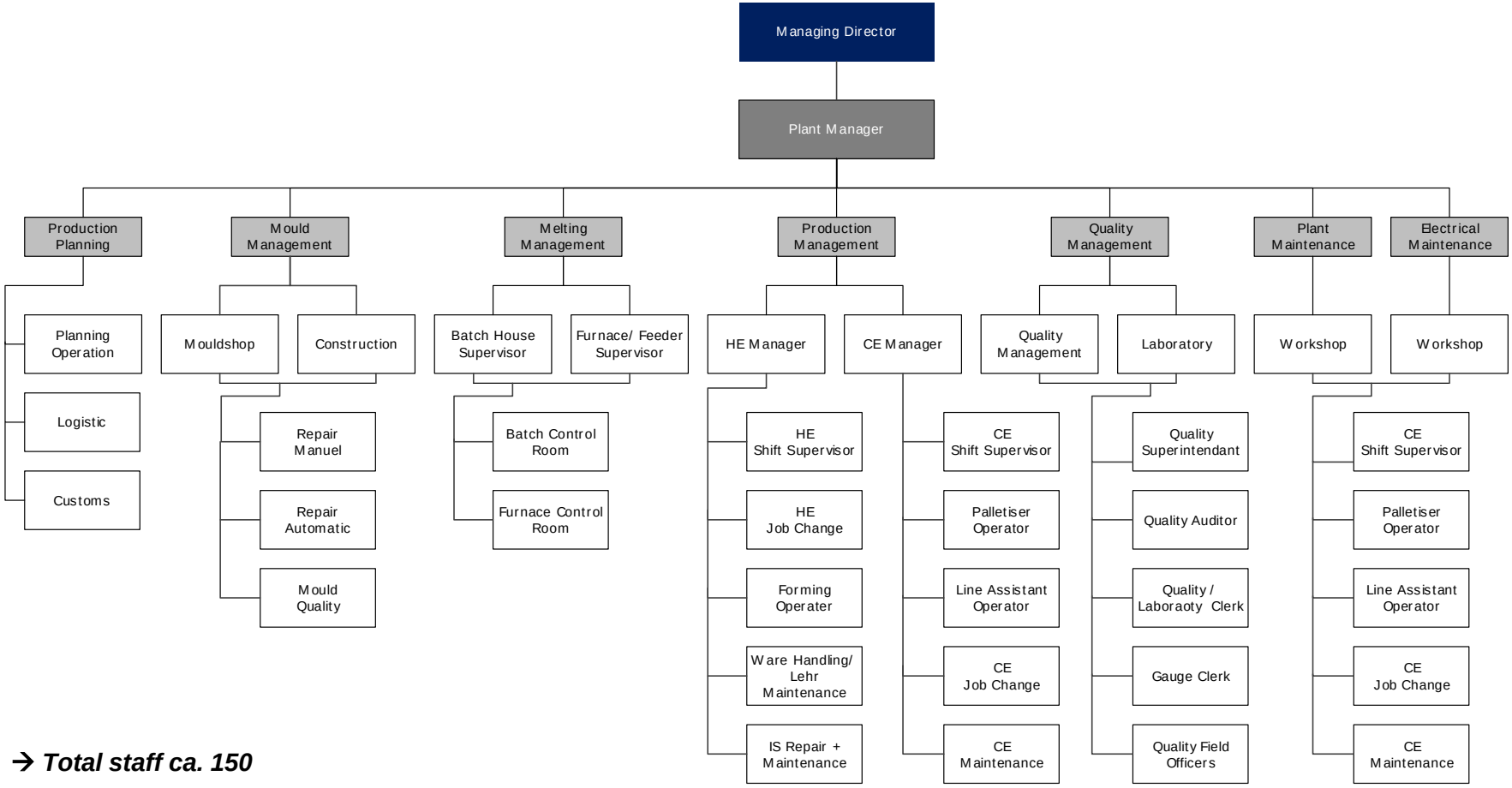


PLANT ORGANIZATION –
Organigram, plant structure

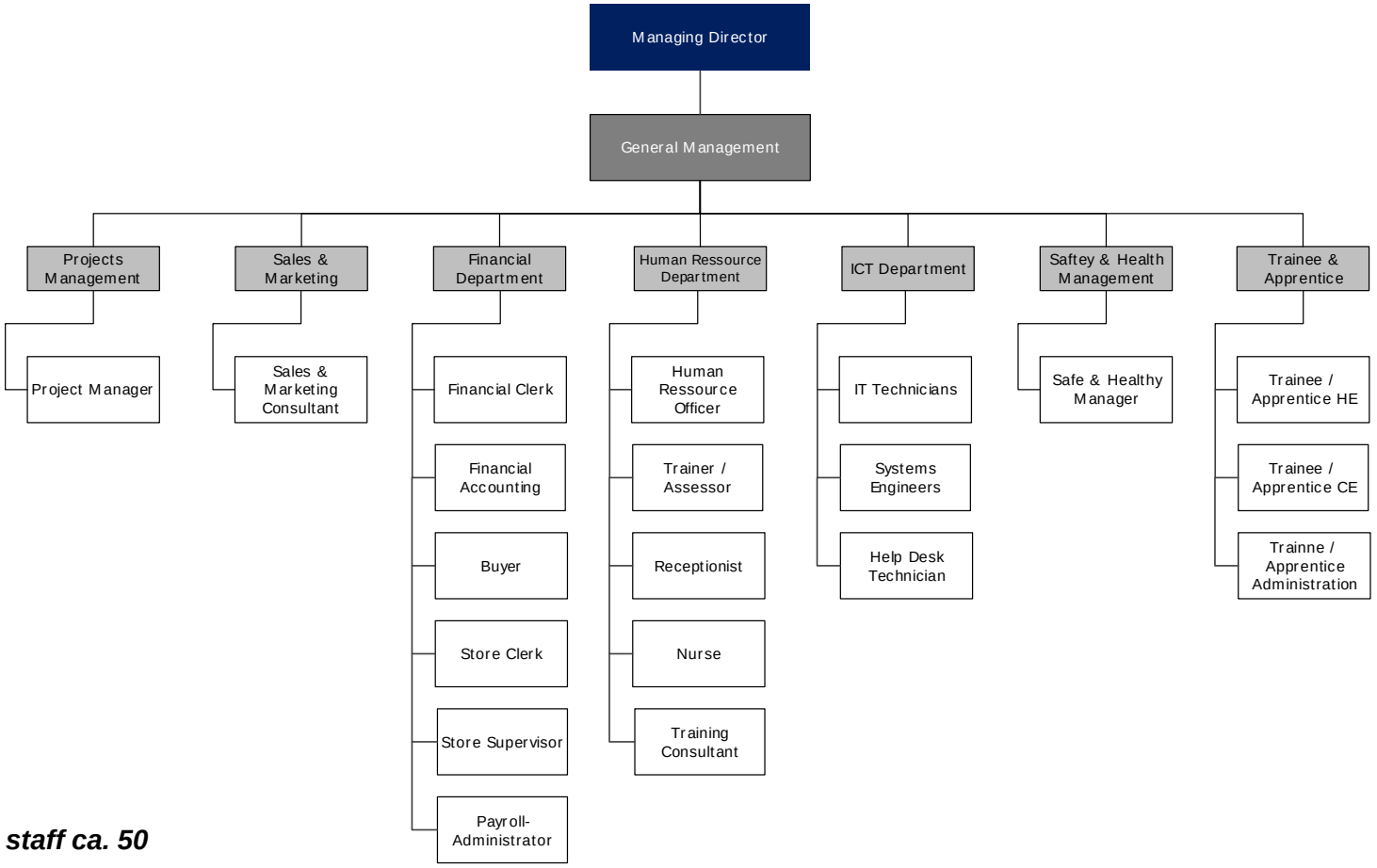
Production Process



→ ***Total staff ca. 150***

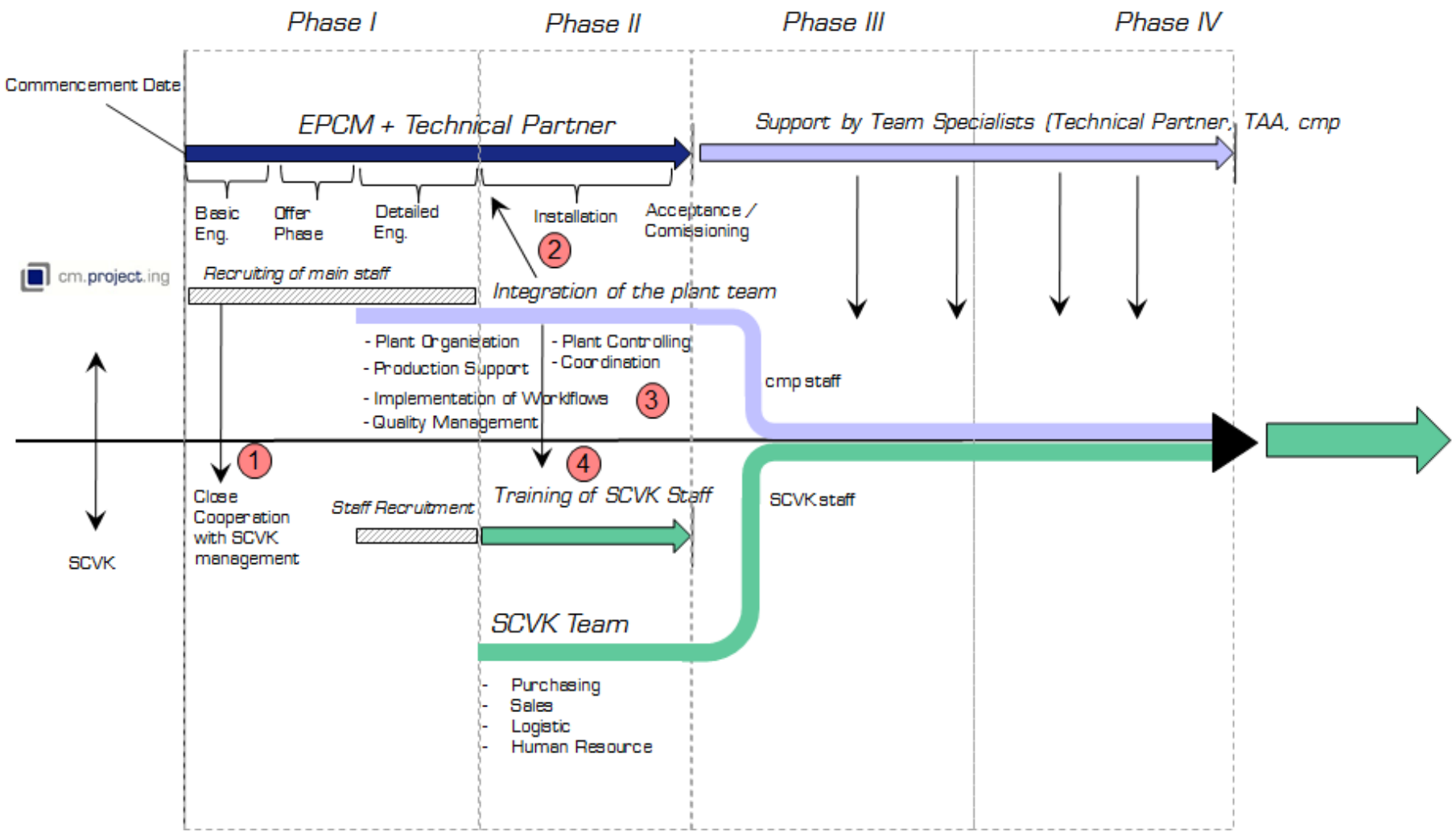
PLANT ORGANIZATION –
Organigram, plant structure

General Management



→ ***Total staff ca. 50***

PLANT ORGANIZATION –
Training & TAA



TIME PLANNING

SCVK - Container Glass Congo

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ID	Task Mode	Task Name	Duration
1		**EPC CONTRACT SIGNING**	**0 days**
2		Contract signing EPC	0 days
3		**CIVIL WORKS + STEEL WORKS**	**475 days**
4		**ENGINEERING**	**475 days**
5		**STEEL WORKS**	**30 days**
6		Foundation planning	30 days
7		Concrete planning for water supply	30 days
8		**STEEL WORKS PLANNING**	**30 days**
9		Production building	30 days
10		Ware house	30 days
11		Batch house	30 days
12		Utility building	30 days
13		Office building	30 days
14		Fire Brigade and Gate house	30 days
15		Internal steelworks for process equipment	30 days
16		**TENDERING**	**61 days**
17		Tender documents	6 days
18		Offer comparison	40 days
19		Negotation phase	14 days
20		Order	1 day
21		**MANUFACTORING**	**60 days**
22		Manufactoring	60 days
23		**TRANSPORT**	**45 days**
24		Packaging	5 days
25		Transport	40 days
26		**EARTH WORKS AND INSTALLATIONS**	**324 days**
27		Earth works	30 days

TIME PLANNING

SCVK - Container Glass Congo

cm.project.ing

ID	Task Mode	Task Name	Duration
28		Foundations	15 days
29		Steel works	30 days
30		**COMMISSIOING**	**282 days**
31		Production building - wind and rain proof	0 days
32		Commissioning Foundations	3 days
33		Commissioning Steel works	3 days
34		**PROCESS EQUIPMENT**	**608 days**
35		**ENGINEERING**	**88 days**
36		Specification	30 days
37		Technical concept	30 days
38		Conceptual layout	14 days
39		2D drawings	14 days
40		Interface engineering	88 days
41		**TENDERING**	**60 days**
42		Tender documents	5 days
43		Offer comparison	40 days
44		Negotation phase	14 days
45		Order	1 day
46		**MANUFACTORING**	**230 days**
47		Detailed engineering	60 days
48		Fabrication	170 days
49		**TRANSPORT**	**64 days**
50		Packaging	14 days
51		Transport	50 days
52		**ASSEMBLY**	**123 days**
53		Batch Equipment	123 days
54		Furnace	123 days
55		IS Machines	123 days
56		Annealing Lehr	123 days
57		Inspection machines	123 days
58		Cold end packaging and palletizing	123 days
59		**COMMISSIONING**	**10 days**
60		Cold test run	5 days
61		Hot test run	5 days
62		Commissioning Process Equipment	0 days

M-2 M1 M3 M5 M7 M9 M11 M13 M15 M17 M19 M21 M23 M25 M27 M29 M31 M33 M35 M37

Production building - wind and rain proof

Commissioning Process Equipment

TIME PLANNING

SCVK - Container Glass Congo

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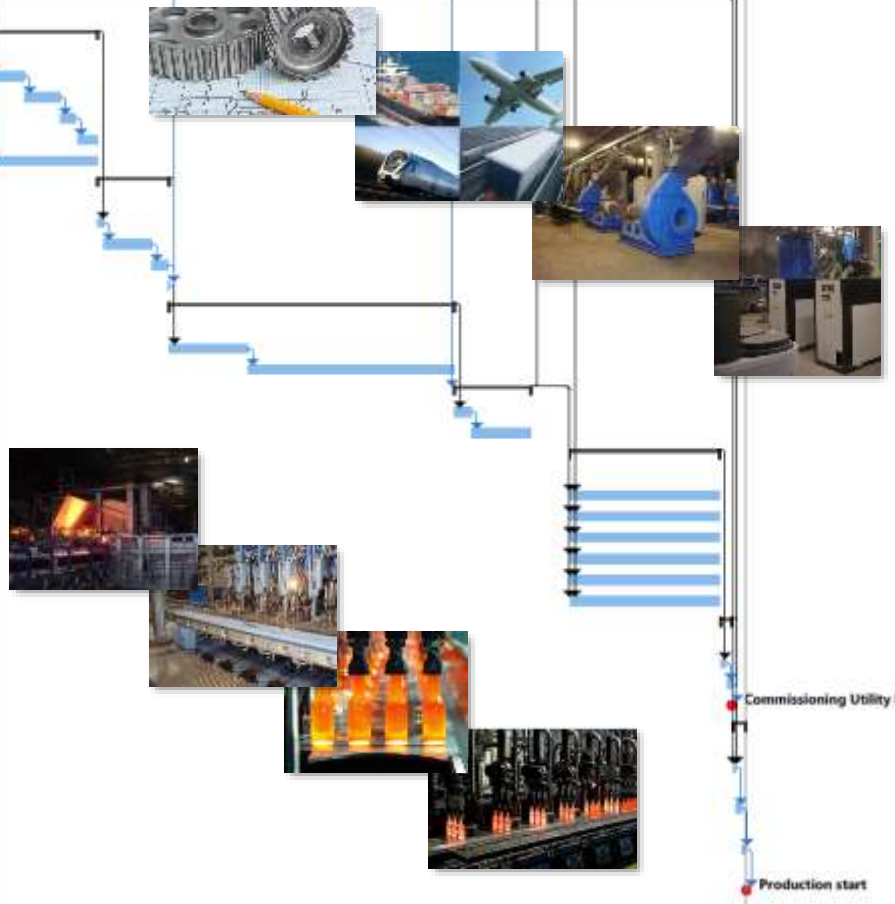
ID	Task Mode	Task Name	Duration
63		**UTILITY EQUIPMENT**	**608 days**
64		**ENGINEERING**	**88 days**
65		Specification	30 days
66		Technical concept	30 days
67		Conceptual layout	14 days
68		2D drawings	14 days
69		Interface engineering	88 days
70		**TENDERING**	**60 days**
71		Tender documents	5 days
72		Offer comparison	40 days
73		Negotation phase	14 days
74		Order	1 day
75		**MANUFACTORING**	**230 days**
76		Detailed engineering	60 days
77		Fabrication	170 days
78		**TRANSPORT**	**64 days**
79		Packaging	14 days
80		Transport	50 days
81		**ASSEMBLY**	**123 days**
82		Compressed Air	123 days
83		Cooling Air	123 days
84		Water supply	123 days
85		Electricity	123 days
86		LPG	123 days
87		Diesel	123 days
88		**COMMISSIONING**	**10 days**
89		Cold test run	5 days
90		Hot test run	5 days
91		Commissioning Utility Equipment	0 days
92		**PLANT TEST AND COMMISSIOINING**	**11 days**
93		Cold test run	3 days
94		Start up and perfonmance test	5 days
95		Commissioning	3 days
96		Production start	0 days

M-2 M1 M3 M5 M7 M9 M11 M13 M15 M17 M19 M21 M23 M25 M27 M29 M31 M33 M35 M37



RAW MATERIALS ORGANIZATION –

Raw materials situation and infrastructure

The Glass will be produced according to a specific recipe. The main components are sand, limestone, soda, dolomite, sodium sulphate and alumina. Some of these raw materials will be mined directly in Congo. It includes sand, limestone, and Dolomite. For limestone and dolomite it is important to note, that these raw materials are not in the right size to use it for the glass production. Before filling in the batch silos it has to be crushed in the right size. For the preparation of these raw materials it could be a solution, to buy a crusher which would be placed above the production building.

NEEDED CAPACITY				
Raw materials	Chemical formula	Capacity [in t/d]	Capacity [in t/m]	Capacity [in t/y]
Sand (Quartz sand)			2.818,80	34.295,40
Limestone	$CaCO_3$	16,13	483,90	5.887,45
Soda	Na_2CO_3	31,36	940,80	11.446,40
Dolomite	$CaMg[CO_3]_2$	13,01	390,30	4.748,65
Sodium sulphate	Na_2SO_4	1,04	31,20	379,60
Alumina	Al_2O_3	3,64	109,20	1.328,60

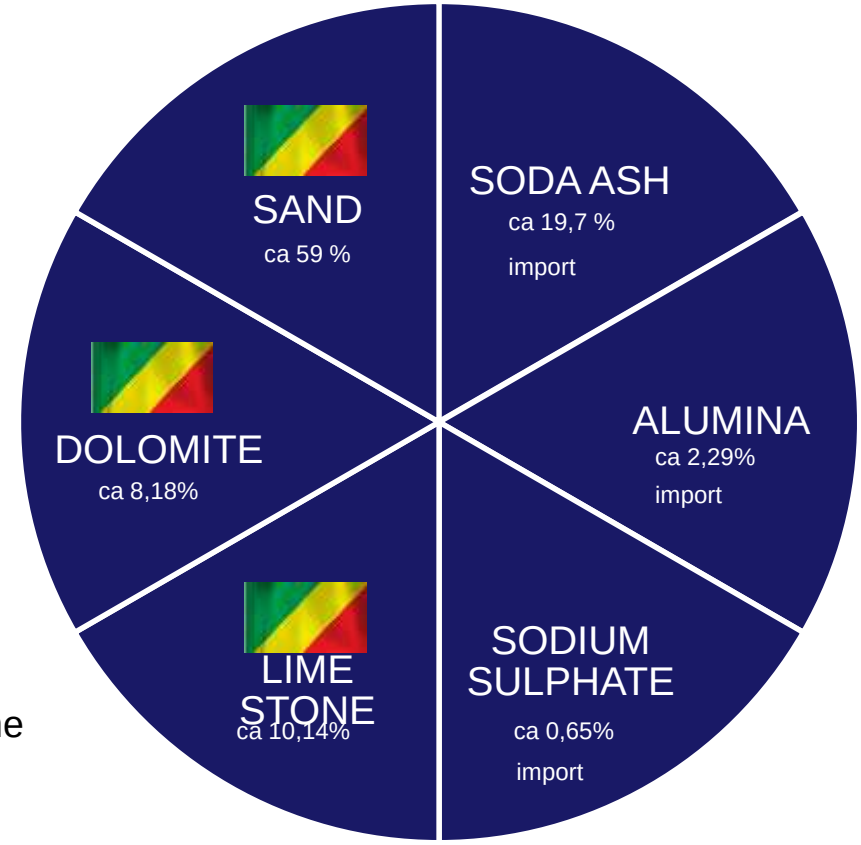
GRAIN SIZE [in mm]															
Raw materials	< 0,1	0,1 – 0,2	0,1 - 0,315	0,1-0,5	0,2-0,315	0,315-0,5	0,315-0,63	0,5	0,5-1,0	> 0,63	0,63-1,0	> 1,0	1,0-1,6	1,6-2,0	> 2,0
Sand (Quartz sand)		40-60%			30-50%		5-15%			0%					
Limestone	3-6 %		30-35 %				25-30 %				30-35 %		5-10 %	< 5 %	0%
Soda	3-6 %		25-30 %			20-25 %			30-35 %			5-10 %			
Dolomite	10-20 %		30-40 %				10-15 %				10-15 %		10-15 %	5-10 %	0%
Sodium sulphate	23-28 %			70-75 %				1-4 %							
Feldspar	65-70 %		30-35 %			< 1 %		0%							

PRINCIPAL CONSTITUENTS OF GLASS

~ Sand

~ Dolomite

~ Lime Stone



~ Soda Ash

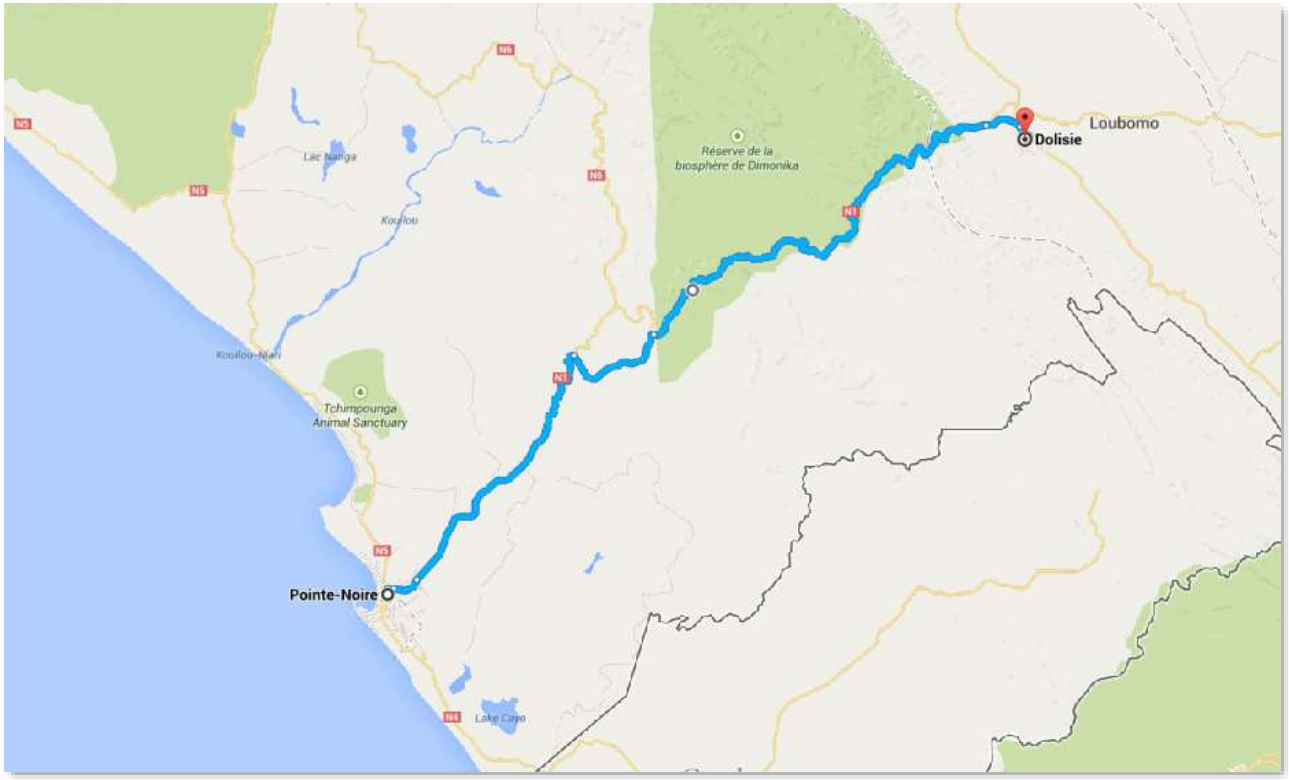
~ Alumina

~ Sodium Sulphate

RAW MATERIALS ORGANIZATION –

Raw materials situation and infrastructure

POINTE NOIRE (SAND)	***DOLISIE (Dolomite (rough stone))***	***DOLISIE (Lime Stone (rough stone))***
Socofran (Mengo/Liambou, Loueme)	*Dolisie*	*Ditadi département de la Bouenza-Republic Congo*
Vindoulou	*Niari*	*Dolisie*
Pointe Noire		*Niari*



Pointe Noire

Distance: 1,5 km
Driving time: 0h 10min.

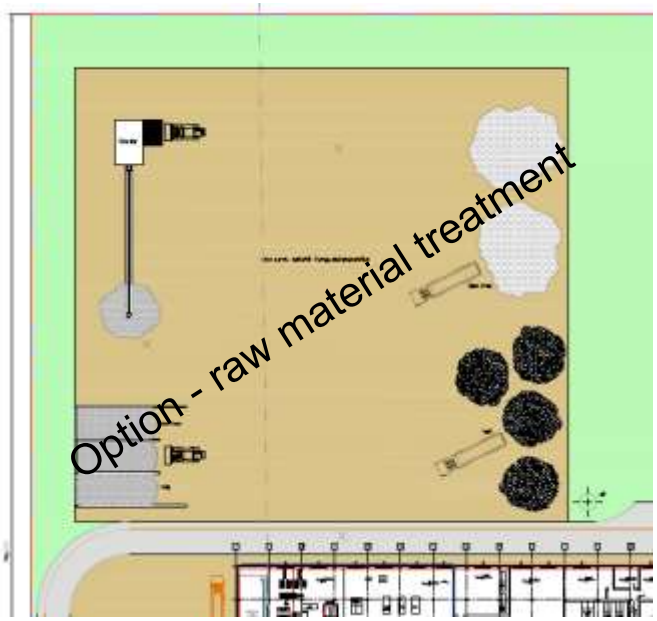
Dolisie

Distance: 158 km
Driving time: 2h 30min.

PROBLEMS

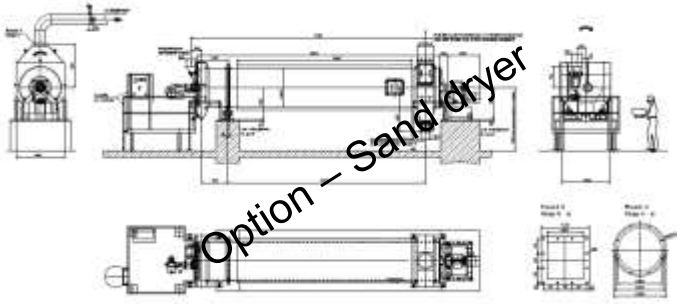
Size of raw materials

The raw materials have to be a specific size to feed it into the batch silos. **Dolomite** and **lime stone** are not in the right size to use it for the glass production process, if its will be mind at Dolisie.
A possible solution is to crush the raw materials inside the plant area. Therefore it needs area to store the material and a crusher where the lime stone and dolomite will be treated to the right size.



Moist of the sand

In Congo there is a rather damp climate. So it could be possible that the sand will be too moist. This would have consequences to the machines and batch, because the moist sand will be clump together. Thereby the machines and belts in the batch house could be damaged. A possible solution is to dry the sand with and optional sand dryer.



Contamination

All raw materials have to be available in a certain quality. Contamination with other compounds, which could have negative influence to the glass production, may not cross over specific values. Due to this fact for each raw material must be carried out a analysis.

CAPEX – Overview

SYSTEM	FOB-PRICE IN €
BATCH PLANT	**3.552.600,00**

WORK PACKAGE	POSITION
…	…
RAW MATERIAL HANDLING	MECHANICAL RAW MATERIAL FEDDING
	PREMIX PREPARATION
	MANUAL FEEDING
	MECHANICAL SAND AND CULLET FEEDING
ACCESSORIES FOR SILO PLANT	OUTLET CONE
	CONNECTION FLANGES
	BIN ACTIVATOR
DOSING WEIGHING MIXING	SCALES
	DOSING UNITS
	MIXER UNITS
	CONVEYORS, CHUTES; HOPPERS
BATCH AND CULLET TRANSPORT	ELEVATORS
	CHUTES
	CONVEYORS
	MAGENTIC SEPARATOR
…	…
ENGINEERING	BASIC ENGINEERING
	DETAILED ENGINEERING
SITE SERVICE	SUPERVISION, COMMSSIONING AND TRAINING
	INSTALLATION (MECHANICAL AND ELECTRICAL)

CAPEX – Overview

SYSTEM	FOB-PRICE IN €
FURNACE	**9.996.190,00**

WORK PACKAGE	POSITION
…	…
COMBUSTION AIR SUPPLY AND WASTE GAS SYSTEM	RADIAL FANS
	VALVES,DAMPER BLOCKS, COMPENSATORS
	PIPE SYSTEM
COMBUSTION SYSTEM FOR GAS	GAS STATION
	BURNERS AND ACCESSORIES
	VALVES, PRESSURE REDUCER,
BATCH CHARGING SYSTEM	BATCH CHARGING MACHINE
	CONTROL CABINET
METERING AND CONTROL SYSTEM	TEMPERATURE METERING
	COMBUSTION AIR FLOW METERING
	FURNACE PRESSURE METERING
	GLASS LEVEL METERING AND CAMERA/TV SYSTEM
FURNACE & FOREHEARTHS	REFRACTORY MATERIAL
	STEELWORK
	HEATING SYSTEM
…	…
ENGINEERING	BASIC ENGINEERING
	DETAILED ENGINEERING
SITE SERVICE	SUPERVISION, COMMSSIONING AND TRAINING
	ASSEMBLY OF STEEL AND REFRACTORY MATERIAL

CAPEX – Overview

SYSTEM	FOB-PRICE IN €
IS & INSPECTION MACHINES	11.572.152,70

WORK PACKAGE	POSITION
…	…
SERVO FEEDER WITH PLUNGER	PUNGER MECHANISM, SHEAR MECHANISM
	SPOUTS, EQUALIZING SECTION
	FEEDER REDRACTORIES
8 SECTION 5 1/2“ DOUBLE GOB	PIPING, CABLING MOULD SUPPORTING MECHANISM
	GOB DISTRIBUTOR, SCOOP HOLDER, FUNNELS
	MACHINE CONTROL EQUIPMENT, MOTORS FOR WARE HANDLING
	FEEDER MECHANISM, TUBES, CONVEYING EQUIPMENT, MOULD HOLDERS,
MOULDS	MOULD PRE HEATING OVEN, 6 SETS OF MOULD
SERVICE EQUIPMENT	AUXILIARY EQUIPMENT
	SUPPLY PIPING, TOOLS, FACTORY CONNECTIONS
WARE TRANSEFER & CROSSCONVEYOR	BASIC WARE TRANSFER, DRIVE AND MOTOR, PUSHERS AND FILLER PLATES, CROSS CONVEYOR SYSTEM
STACKER	SERVO STACKER
…	…
INSPECTION MACHINES	FLEX INSPECTION C
	FLEX INSPECTION M
SERVICES	TRAINING AT EMHART
	TRAINING ON SITE
	INSTALLATION AND COMMISSIONING

CAPEX – Overview

SYSTEM	FOB-PRICE IN €
ANNEALING LEHR	**666.900,00**

WORK PACKAGE	POSITION
…	…
HEATING SYSTEM	BURNERS, BUNRER TUBES, GAS RING PIPES
	FANS
COOLING SYSTEM	COOLING ZONES
	COOLING FANS
	CIRULATION COOLING AIR SYSTEM
DISCHARGE TABLE	MOTOR DRIVE SYSTEM
	PRESSURE ROLLER, DISCHARGE ROLLER
	CONVEYING BELTS
CONTROL MONITORING	CONTROL PANEL
	TEMPERATURE CONTROL, SPEED CONTROL
COLD END COATING	SPRAYING UNIT, COLD END BRIDGE, CONTROL UNIT DOSING UNIT
…	…
SERVICE	INSTALLATION
	TRAINING
	COMMISSIONING AND START UP

CAPEX – Overview

SYSTEM	FOB-PRICE IN €
COLD END CONVEYING AND PACKAGING	**1.802.850,30**

WORK PACKAGE	POSITION
…	…
TRANSTECH BOTTLE CONVEYORS	CROSS CONVEYOR AT THE LEHR
	BUFFER TABLE
	BOTTLE CONVEYOR, BOTTLE ALIGNER
	BOTTLE SPACER
	ELECTRICAL CABINET AND CONTROL DESK
	SORT OUT CONVEYOR
SEMITECH PALLETIZER	ROW STACKER
	ACCUMULATION TABLE
	LAYER TRANSFER INCL. CENTRING DEVICE
	CHAIN CONVEYOR, ROLLER CONVEYOR
	CORNER CONVEYOR, DRIVE UP PROTECTION
SHRINKING LINE	CONVEYOR, CENTRING DEVICE
	SHRINKING SYSTEM, SHRINKING MACHINE
...	...
SERVICES	INSTALLATION
	TRAINING
	COMMISSIONING

CAPEX – Overview

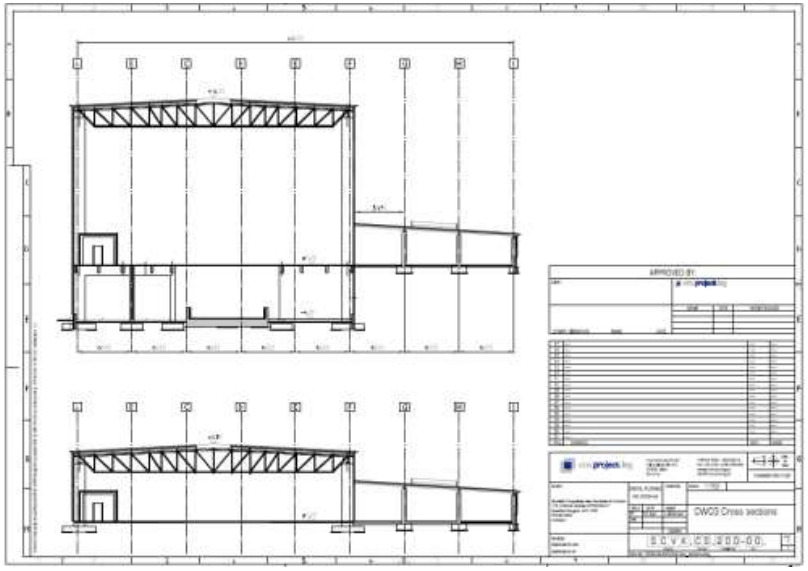
SYSTEM	FOB-PRICE IN €
UTILITIES	**9.436.105,52**

WORK PACKAGE	POSITION
…	…
COMPRESSED AIR	COMPRESSORS; DRYER, RESERVATORIES, VALVES FILTERS, OIL TREATMENT, CYCLONE, PIPING
VACUUM	PUMPS, FILTER, CONDENSATE DRAINER, RECEIVER, PIPING, ELECTRICAL CABINET
IS COOLING AIR	RADIAL VENTILATOR, FREQUENCY CONVERTER, VALVES, PIPING, DUCTING, ELECTRICAL CABINET, CABLING
COOLING WATER	PUMPS, COOLING TOWERS, RESERVATORIES, INSTRUMENTATION, VALVES, MANIFOLDS, MOTORS, VENTILATION, FILTER
PROCESS WATER	PUMPS, RESERVATORIES, COOLING TOWERS, WASTE OIL TANK SYSTEM
WASTE WATER	PRE-TREATMENT INCL. CONTROL CABINET, SOFTENING UNIT, PUMP STATION, WATER TREATMENT UNIT, PIPING
OSMOSIS + SHEAR AND SCOOP SPRAY	OSMOSIS PLANT, SHEAR & SCOOP SPRAY SYSTEM, NOZZLES VALV BOXES, PIPING
EXTINGUISHING WATER	PMPS, RESERVATORIES, DIESEL TANK FIRE PUMPS
LPG	EQUIPMENT,MEASUREMENT AND CONTROL EQUIPMENT
DIESEL	EQUIPMENT,MEASUREMENT AND CONTROL EQUIPMENT
ELECTRIC	MV SWITCH GEAR, TRANSFORMERS INCL. CABLE, lv MAIN DISTRIBUTION PANELS, lv DISTRIBUTION PANELS, CABLE TRAYS
IT	HARDWARE SOFTWARE
MAIN PIPING	MAIN PIPING
SERVICES	MAIN PIPING, ELECTRICAL AND MECHANICALL INSTALLATION

CAPEX – Overview

SYSTEM	FOB-PRICE IN €
PRODUCTION BUILDING	**4.950.000,00**

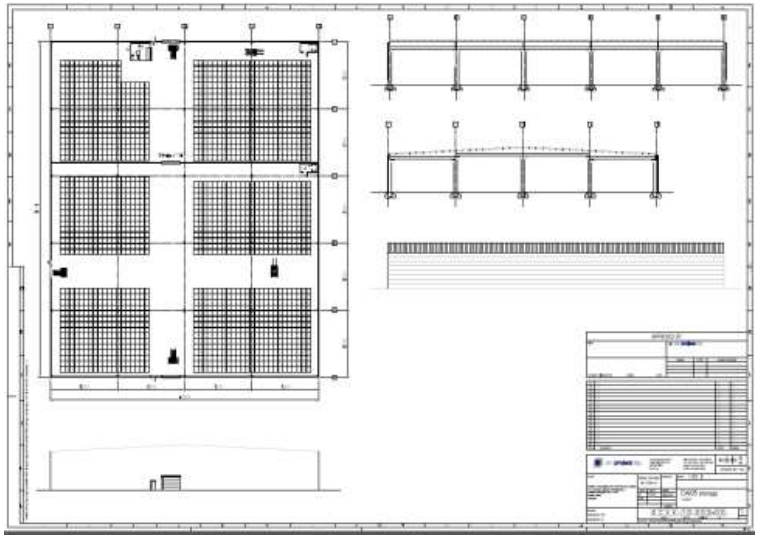
WORK PACKAGE	POSITION
PRODUCTION BUILDING LEVEL -6	PREPARATION WORKS
PRODUCTION BUILDING LEVEL 0	EARTH WORKS
PRODUCTION BUILDING LEVEL +4	CONCRETE WORKS
	FORMWORKS
	PE FILM UNDER FLOOR SLAB
	AGGREAGATE
	MASONRY HOLLOW CHIPBOARD, CEMENT MORTAR
	MORTAR CEMENT PLASTER
	STAIRCASE
	BEAMS
	FLOORS
	PAVINGS



CAPEX – Overview

SYSTEM	FOB-PRICE IN €
WARE HOUSE	**1.320.000,00**

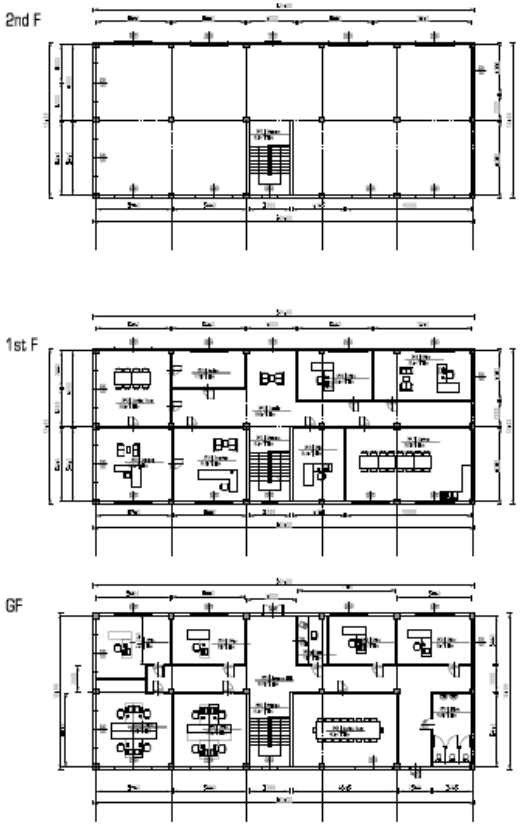
WORK PACKAGE	POSITION
WARE HOUSE	PREPARATION WORKS
	EARTH WORKS
	CONCRETE WORKS / LEAN CONCRETE
	FORMWORKS
	PE FILM UNDER FLOOR SLAB
	AGGREAGATE
	MASONRY HOLLOW CHIPBOARD, CEMENT MORTAR
	SMOOTH FINISH TO CONCRETE SLAB
	STAIRCASE
	BEAMS
	FLOORS
	PAVINGS

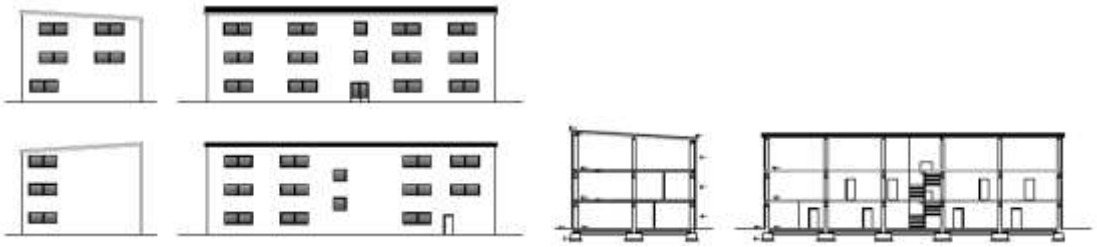


CAPEX – Overview

SYSTEM	FOB-PRICE IN €
OFFICE BUILDING	**1.367.400,00**

WORK PACKAGE	POSITION
OFFICE BUILDING	PREPARATION WORKS
	EARTH WORKS
	CONCRETE WORKS / LEAN CONCRETE
	FORMWORKS
	PE FILM UNDER FLOOR SLAB
	AGGREAGATE
	MASONRY HOLLOW CHIPBOARD, CEMENT MORTAR
	SMOOTH FINISH TO CONCRETE SLAB
	STAIRCASE
	BEAMS
	FLOORS
	PAVINGS

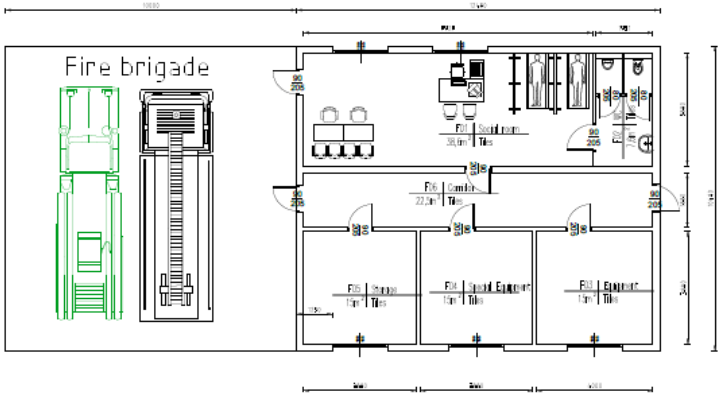


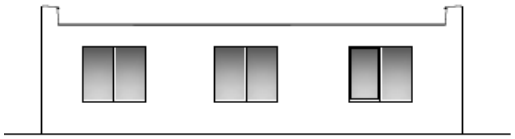


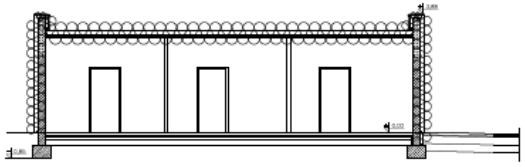
CAPEX – Overview

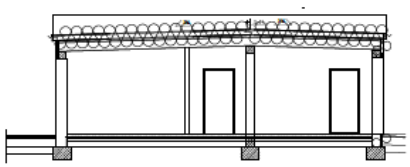
SYSTEM	FOB-PRICE IN €
FIRE BRIGADE BUILDING	**183.878,00**

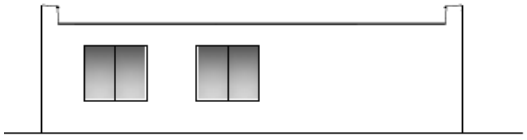
WORK PACKAGE	POSITION
FIRE BRIGADE BUILDING	PREPARATION WORKS
	EARTH WORKS
	CONCRETE WORKS / LEAN CONCRETE
	FORMWORKS
	PE FILM UNDER FLOOR SLAB
	AGGREAGATE
	MASONRY HOLLOW CHIPBOARD, CEMENT MORTAR
	BEAMS
	FLOORS







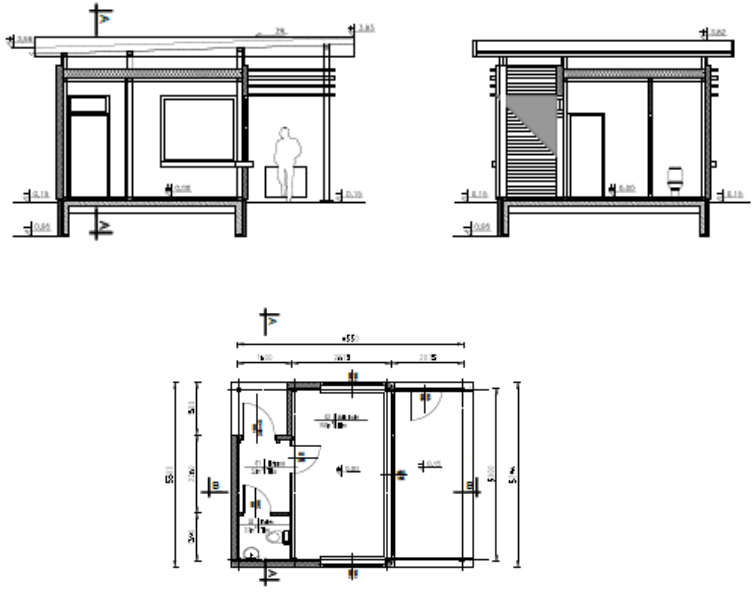


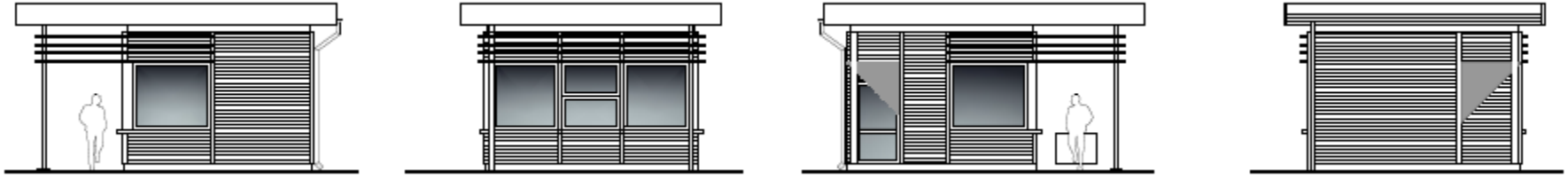


CAPEX – Overview

SYSTEM	FOB-PRICE IN €
GATEHOUSE	**12.973,00**

WORK PACKAGE	POSITION
GATE HOUSE	PREPARATION WORKS
	EARTH WORKS
	CONCRETE WORKS / LEAN CONCRETE
	FORMWORKS
	PE FILM UNDER FLOOR SLAB
	AGGREAGATE
	MASONRY HOLLOW CHIPBOARD, CEMENT MORTAR
	MORTAR CEMENT PLASTER
	BEAMS
	FLOORS





CAPEX – Overview

SCVK -Congo Budget Estimation

BATCH PLANT	FOB - PRICE
Raw Material Handling	302.130,00 €
Accessories for Silo Plant No. 01 – 12	4.764,00 €
Dosing and Weighing	390.840,00 €
Cullet Dosing and Weighing	72.708,00 €
Batch and Cullet Transport	180.396,00 €
Cullet Return System	368.136,00 €
Electrical Control System	369.720,00 €
Steelwork, Silos, Building etc.	892.896,00 €
Engineering	155.178,00 €
Spare Parts	90.468,00 €
Site Service	725.364,00 €
Total sum	**3.552.600,00€**

FURNACE	FOB - PRICE
Engineering Package Furnace	220.000,00 €
Combustion Air Supply and Waste Gas System	158.400,00 €
Furnace Combustion System for Gas	478.500,00 €
Furnace Combustion System for Oil	159.500,00 €
Electrical Heating System	30.800,00 €
Batch Charging System	61.600,00 €
Tank and Throat Cooling Wind System	313.500,00 €
Bubbling System	67.650,00 €
Metering and Control System	188.100,00 €
Ancillary Equipment	110.000,00 €
Engineering Package for Distributor + Forehearths	23.430,00 €
Distributor	123.420,00 €
Forehearths 11 and 12	540.100,00 €
Engineering and Equipment for Distributor and Forehearths together	153.890,00 €
1 SCADA-System	107.470,00 €
Scope of Site Services	175.010,00 €
Delivery, assembly and installation of furnace equipment parts	725.670,00 €
Delivery of Steel	777.480,00 €
Assembly of Steel	319.110,00 €
Assembly of refractory material	709.500,00 €
Heating up and filling	116.380,00 €
Hot sealing and closing of expansion joints	54.560,00 €
Refractory Material	3.829.100,00 €
sum	**9.443.170,00 €**
Options	
Batch Charging Machine with Control Panel (Spare)	70.070,00 €
Training at Company Sorg	17.290,00 €
On-Site Technical Support for 3 Months	173.160,00 €
Cabling Work	292.500,00 €
Total sum	**9.996.190,00€**

IS MACHINES & INSPECTION MACHINES	FOB - PRICE
HOT END EQUIPMENT	
Servo Feeder with 570 Plunger	483.600,00 €
8 Sec. 5 ½" IS Machine	3.728.700,00 €
Accessories B&B	1.131.600,00 €
Additional Accessories P&B	54.300,00 €
Service Equipment	65.700,00 €
178 Ware Transfer Wheel	57.000,00 €
Cross Conveyor	74.700,00 €
2- Axis Stacker	267.900,00 €
FlexLube System	62.400,00 €
Fixtures 1	71.700,00 €
Spare Parts	501.600,00 €
Accessories Spare Parts	112.500,00 €
FlexIS Remote Service	22.500,00 €
Hot End Coating Station	190.050,00 €
6 Sets of BK and BW mold	433.050,00 €
Mold Preheating Oven	15.900,00 €
Service	1.299.067,50 €
Training at Emhart Glass Facility	18.000,00 €
On-Site Training	15.000,00 €
COLD END EQUIPMENT	
FleXinspect C	337.500,00 €
Spare Parts FleXinspect C	42.105,00 €
FleXinspect M	682.500,00 €
Spare Parts FleXinspect M	48.348,00 €
Installation & Commissioning	86.250,00 €
On-Site Training	18.750,00 €
Export boxing, handling and documentation	104.400,00 €
Sum	**9.925.120,50 €**
Options	
Second bottle conveyor line (possible future)	814.332,20 €
16 Sets of BK and BW mold	832.700,00 €
Total sum	**11.572.152,70€**

ANNEALING LEHR	FOB - PRICE
Annealing Lehr	471.380,00 €
One Lehr Mesh Belt	38.246,00 €
One control panel air conditioner	3.874,00 €
Cold end coating system type CES 650/2	60.242,00 €
Dosing unit type DOS	12.480,00 €
Transport costs	20.800,00 €
Installation incl. training	47.398,00 €
Commissioning and start up	12.480,00 €
Total sum	**666.900,00 €**

COLD END CONVEYING AND PACKAGING	FOB - PRICE
Transtech bottle conveyoing lines (incl. Engineering)	583.078,80 €
Semitech glass palletizer (incl Engineering)	390.854,40 €
Shrinking + wrapping (incl. Engineering)	252.380,40 €
Transport	68.448,00 €
Installation	274.161,60 €
Sum	**1.568.923,20 €**
Options	
Additional vacuum plate (price each plate)	990,00 €
Second bottle conveyor line (possible future)	217.097,10 €
Motorized driven centering funnel, synchronized 1motor	5.720,00 €
Motorized driven centering funnel, Separated longitudinal and transversal side 2motors	10.120,00 €
Total Sum	**1.802.850,30 €**

CAPEX – Overview

UTILITIES / INCL. SAND DRYER	FOB - PRICE
Compressed air low	
Air Screw compressors	499.792,80 €
Refrigeration dryer	88.604,10 €
Reservatories	5.944,90 €
Internal Valves, instrumentation & compensators	15.080,00 €
Filter	21.910,20 €
Oil treatment, cyclone,	24.317,80 €
Compressor management system	7.010,90 €
Piping & Exhausr air ducting	107.510,00 €
Clectrical cabinet	24.050,00 €
Training & commissioning	13.000,00 €
Documentation & labeling	6.500,00 €
freight charges	13.000,00 €
Compressed air high	
Air compressors (screw)	208.000,00 €
Refrigeration dryer	44.850,00 €
Reservatories	5.944,90 €
Internal Valves, instrumentation & compensators	8.785,40 €
Filter	5.374,20 €
Oil treatment	3.861,00 €
Compressor management system	7.504,90 €
Piping & Exhausr air ducting	78.000,00 €
Electrical cabinet	18.200,00 €
Training & commissioning	13.000,00 €
Documentation & labeling	6.500,00 €
freight charges	10.400,00 €
Vacuum	
Pumps	332.605,00 €
Filter	42.003,00 €
Condensate drainer	4.810,00 €
Receiver	23.686,00 €
Maintenance kit	7.254,00 €
Piping	32.500,00 €
Electrical cabinet	15.600,00 €
Training & commissioning	6.500,00 €
Documentation & labeling	6.500,00 €
freight charges	10.400,00 €

IS Cooling Air	
Radial ventilator	71.786,00 €
Frequency converter	105.820,00 €
Valves, instrumentation, compensators, dispatcher, tubes	84.929,00 €
Piping,Ducting	27.170,00 €
Electrical cabinet	81.380,00 €
Cabling	20.540,00 €
Training & commissioning	8.450,00 €
Documentation & labeling	6.500,00 €
freight charges	5.200,00 €
Cooling Water	
Pumps, Cooling tower	
Reservatories	
Instrumentation	
Valves	181.261,60 €
Manifolds	
Motors, ventilation	
Filter	
freight charges	13.000,00 €
Training & commissioning	6.500,00 €
Documentation & labeling	6.500,00 €
Process water	
Pumps	
Reservatories	294.494,20 €
Cooling towers	
Waste oil tank system	
freight charges	13.000,00 €
Training & commissioning	6.500,00 €
Documentation & labeling	6.500,00 €
Water Treatment	
Pre-Treatment incl. control cabinet	156.000,00 €
Softening unit	13.000,00 €
Pump station	32.500,00 €
Water treatment unit	19.500,00 €
Piping	incl.
freight charges	10.400,00 €
Documentation & labeling	incl.

CAPEX – Overview

Osmosis+ Shear and Scoop Spray	
Osmosis plant	*60.756,30 €*
Shear & Scoop Spray System	*77.037,00 €*
Nozzles	*7.272,00 €*
Valve boxes	*7.866,00 €*
Piping	*12.856,50 €*
Spare parts	*28.903,62 €*
freight charges	*6.000,00 €*
Extinguishing water	
Pumps	*108.550,00 €*
Reservatories	*130.000,00 €*
Diesel tank fire pumps	*5.200,00 €*
LPG	
Equipment	*349.700,00 €*
Measurement and control equipment	*45.500,00 €*
Service	*33.800,00 €*
Spare parts	*10.400,00 €*
Diesel	
Equipment	*236.500,00 €*
Measurement and control equipment	*11.000,00 €*
Service	*13.200,00 €*
Spare parts	*5.500,00 €*
Electric	
MV switch gear	*106.496,00 €*
Transformers incl. cable	*213.824,00 €*
LV main distribution panels	*358.592,00 €*
LV distribution panels	*136.272,50 €*
Cable trays	*232.264,50 €*
IT	
Hardware	*115.700,00 €*
Software	*370.500,00 €*
Main Piping	
Material	*937.200,00 €*
Installtion	*694.800,00 €*
Testbetrieb, Inbetriebnahme, Einweisung, Schulung	*72.000,00 €*
Supervision	*144.000,00 €*

Main electrical wires	
Material	*405.205,20 €*
Installation	*150.000,00 €*
Mechanical installation of Utilities	
Compressed air low	*60.000,00 €*
Compressed air high	*42.000,00 €*
Vacuum	*36.000,00 €*
IS Cooling Air	*49.500,00 €*
Osmosis + Shear & Scoop Spray	*36.000,00 €*
Cullet water	*48.000,00 €*
Cooling water	*48.000,00 €*
Extinguishing water	*18.000,00 €*
Water treatment	*36.000,00 €*
LPG	*96.000,00 €*
Diesel	*72.000,00 €*
Electrical Installation of Utillities	
Compressed Air low	*48.000,00 €*
Compressed Air high	*30.000,00 €*
Vacuum	*21.600,00 €*
IS Cooling Air	*43.680,00 €*
Osmosis + Shear & Scoop Spray	*18.000,00 €*
Cullet Water	*36.000,00 €*
Cooling Water	*36.000,00 €*
Extinguishing water	*12.000,00 €*
Water teatment	*24.000,00 €*
LPG	*48.000,00 €*
Diesel	*24.000,00 €*
Total sum	**8.859.605,52 €**
Options	
Sand dryer	
Sand Dryer	*198.500,00 €*
LPG	
Additional price for case "refinery turnaround" OPTION B	*378.000,00 €*
Total Sum	**9.436.105,52 €**

CAPEX – Overview

BUILDINGS	FOB - PRICE
Civil works, Foundations and Steel Works	
Batch plant and control room	*585.000,00 €*
Production building	*4.950.000,00 €*
Finished products warehouse	*1.320.000,00 €*
Office building	*1.367.400,00 €*
Utility Building	*718.000,00 €*
Fire Brigade building	*183.878,00 €*
Gatehouse Building	*12.973,00 €*
Main entrance and roof	*420.200,00 €*
External Drainage	*654.500,00 €*
Drainage systems	*533.500,00 €*
Streets and Places	*1.280.000,00 €*
Total Sum	**12.025.451,00 €**

OTHERS	FOB - PRICE
Workshop + Laboratory	*960.000,00 €*
Stairs and Platform (Steelworks)	*250.000,00 €*
Fence	*90.000,00 €*
Site equipment (office container, tools, lifting devices.....ect)	*1.800.000,00 €*
Project Management (including Site Management	*3.100.000,00 €*
Engineering	*2.600.000,00 €*
Architectual Services	*1.800.000,00 €*
Total Sum	**10.600.000,00 €**

Grand total (Single cold end line)	**58.620.820,22 €**
Grand total (double cold end line)	**59.652.249,52 €**

CAPEX – Roughly cash flow planning

Procurement Phase + Award
Engineering phase
Manufacturing phase
Delivery phase
installation phase
Acceptance / Commissioning

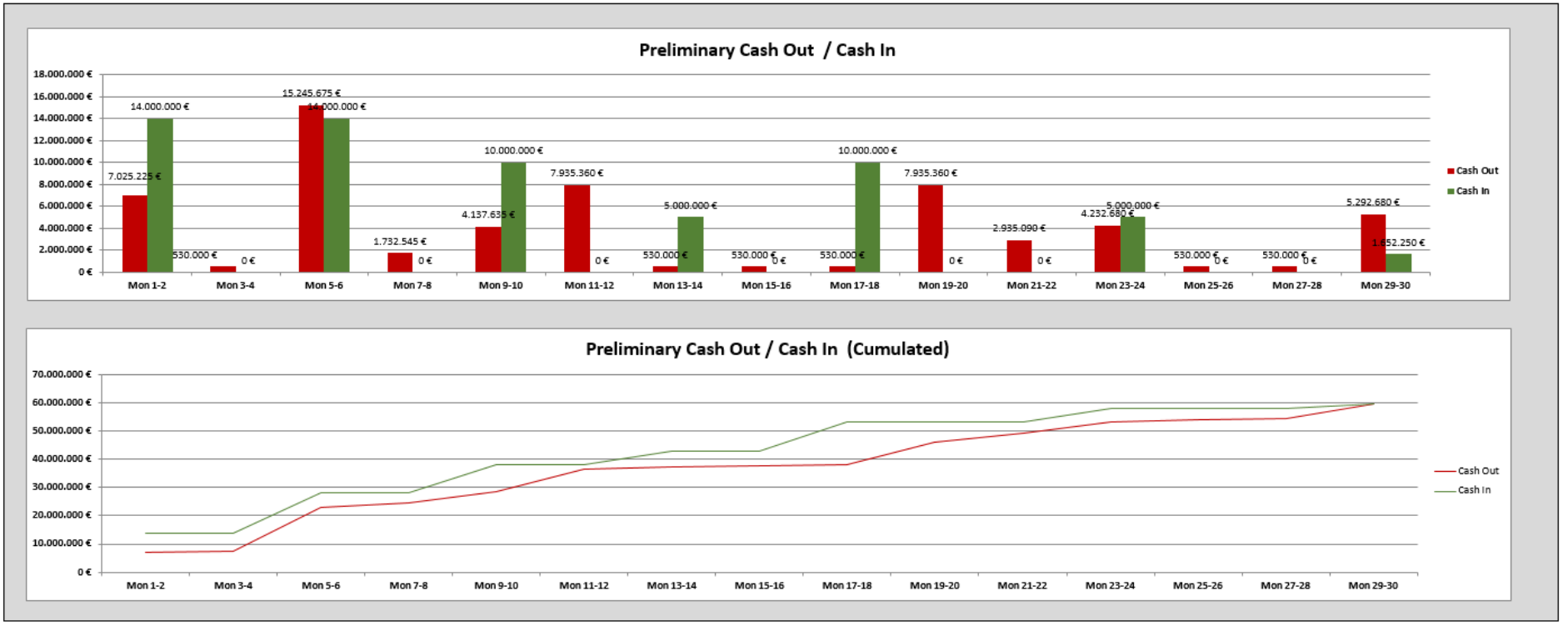
SubProject	Cash Out	Cash Out														Total
		Mon 1-2	Mon 3-4	Mon 5-6	Mon 7-8	Mon 9-10	Mon 11-12	Mon 13-14	Mon 15-16	Mon 17-18	Mon 19-20	Mon 21-22	Mon 23-24	Mon 25-26	Mon 27-28	Mon 29-30	
Engineering civil works, foundations and steel works	12.025.451	10%		30%	10%	30%						20%					100%
Batch Plant	3.552.600	10%		30%			20%				20%		10%			10%	100%
Furnace	9.396.190	10%		30%			20%				20%		10%			10%	100%
IS & Inspection Machines	11.572.153	10%		30%			20%				20%		10%			10%	100%
Annealing Lehr	686.900	10%		30%			20%				20%		10%			10%	100%
Packaging and Palletizing	1.602.850	10%		30%			20%				20%		10%			10%	100%
Utilities	9.436.106	10%		30%			20%				20%		10%			10%	100%
Others incl. cmp services	10.600.000	20%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	15%	100%
Total	59.852.250																

CAPEX – Roughly cash flow planning

SubProject	Cash Out	Cash Out														Total
		Mon 1-2	Mon 3-4	Mon 5-6	Mon 7-8	Mon 9-10	Mon 11-12	Mon 13-14	Mon 15-16	Mon 17-18	Mon 19-20	Mon 21-22	Mon 23-24	Mon 25-26	Mon 27-28	Mon 29-30	
Engineering civil works, foundations and steel works	12.025.451	1.202.545		3.607.635	1.202.545	3.607.635						2.405.090					12.025.451
Batch Plant	3.552.600	355.260		1.065.780			710.520				710.520		355.260			355.260	3.197.340
Furnace	9.396.190	939.619		2.819.057			1.879.238				1.879.238		939.619			939.619	8.456.571
IS & Inspection Machines	11.572.153	1.157.215		3.471.646			2.314.431				2.314.431		1.157.215			1.157.215	10.414.937
Annealing Lehr	666.900	66.690		200.070			133.380				133.380		66.690			66.690	600.210
Packaging and Palletizing	1.802.850	180.285		540.855			360.570				360.570		180.285			180.285	1.622.565
Utilities	9.436.106	943.611		2.830.832			1.887.221				1.887.221		943.611			943.611	8.492.495
Sonstiges incl. cmp services	10.600.000	2.120.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	530.000	1.590.000	7.950.000
Total	59.652.250	7.025.225	530.000	15.245.675	1.732.545	4.137.635	7.935.360	530.000	530.000	530.000	7.935.360	2.935.090	4.232.680	530.000	530.000	5.292.680	
Cumulated		7.025.225	7.555.225	22.800.900	24.533.445	28.671.080	36.606.440	37.136.440	37.666.440	38.196.440	46.131.800	49.066.890	53.299.570	53.829.570	54.359.570	59.652.250	

SubProject	Cash In	Cash In														Total
		Mon 1-2	Mon 3-4	Mon 5-6	Mon 7-8	Mon 9-10	Mon 11-12	Mon 13-14	Mon 15-16	Mon 17-18	Mon 19-20	Mon 21-22	Mon 23-24	Mon 25-26	Mon 27-28	Mon 29-30	
Cash In		14.000.000		14.000.000		10.000.000		5.000.000		10.000.000			5.000.000			1.652.250	
Total		14.000.000	-	14.000.000	-	10.000.000	-	5.000.000	-	10.000.000	-	-	5.000.000	-	-	1.652.250	
Cumulated		14.000.000	14.000.000	28.000.000	28.000.000	38.000.000	38.000.000	43.000.000	43.000.000	53.000.000	53.000.000	53.000.000	58.000.000	58.000.000	58.000.000	59.652.250	

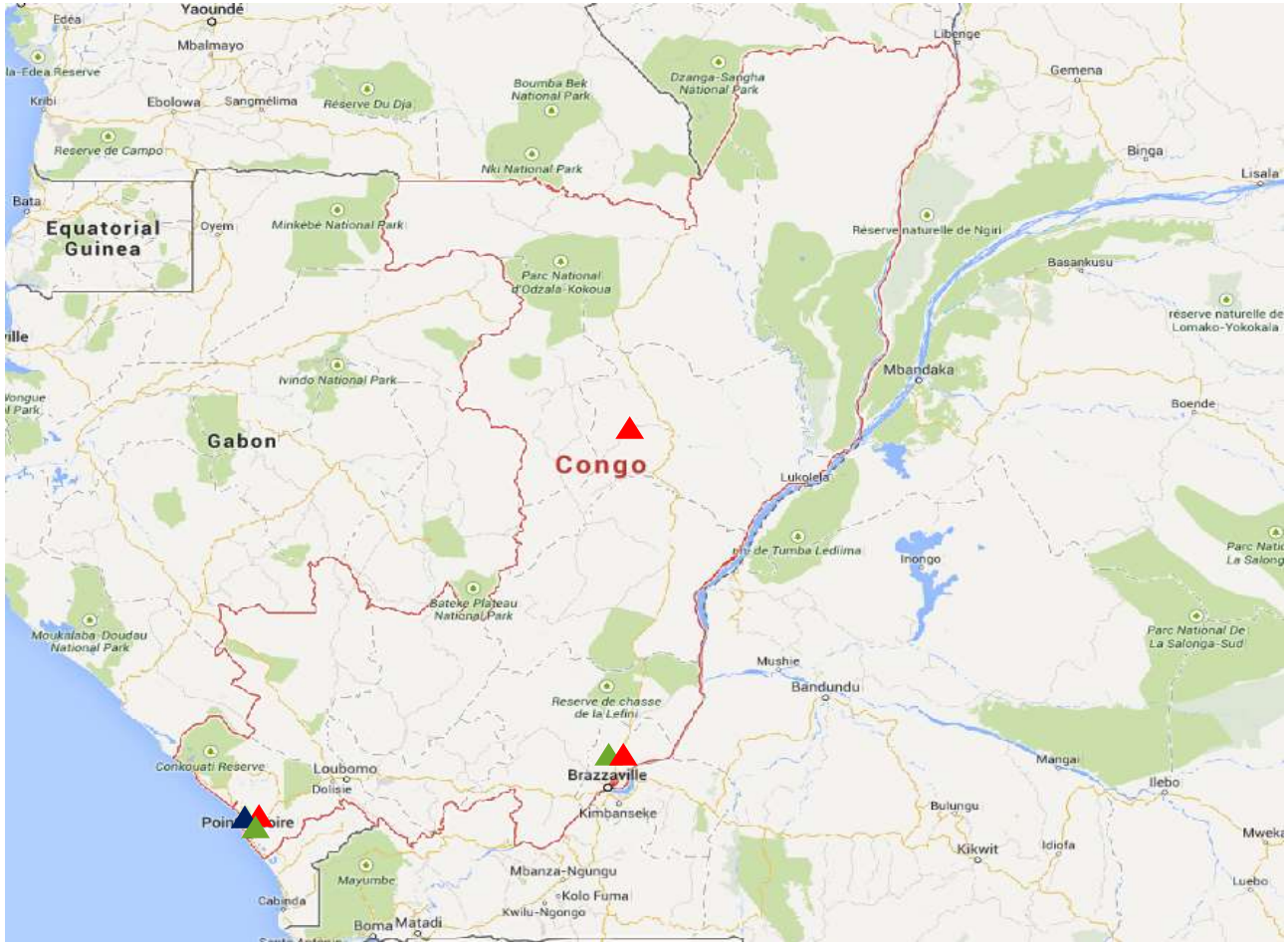
CAPEX – Roughly cash flow planning



OPEX – Product portfolio and sales market

SCVK PRODUCT PORTFOLIO						
Description	Color	Forming process	weight in g	Volume in ml	Body Ø in mm	Height in mm
Bambi	white	blow / blow	335	300	60,8	228
Bako	white	blow / blow	380	300	62	245,5
Coca	white	blow / blow	380	300	60,8	245,7
Bremer	brown	blow / blow	307	330	63	224
Bremer	brown	blow / blow	480	650	77,5	280
Coca	white	blow / blow	600	600	75	285
Coca light	white	blow / blow	305	300	61	220
Cuca	brown	blow / blow	220	310	65,3	158
Euro	brown	blow / blow	350	500	70	233
Fanta light	white	blow / blow	305	300	61	220
Guiness	brown	blow / blow	495	650	80	233
Legend	green	blow / blow	335	330	61,2	232,5
Multi	white	blow / blow	600	600	75	285,5
Mutzig	green	blow / blow	335	330	61,2	232,5
Nocal	brown	blow / blow	230	330	52,1	198,2
Primus	brown	blow / blow	350	500	70,6	250,6
Primus	brown	blow / blow	470	650	82,7	233
Primus	brown	blow / blow	500	720	82	251
Sagresse	brown	blow / blow	330	245	61,9	233
Sprite	green	blow / blow	380	330	61,7	245,81
Pot	white	press / plow	370	850	95,5	140
Pot	white	press / blow	184	375	69,1	118,6

SALES MARKET IN CONGO



- **SCVK:** - Pointe Noire
- **Bralico:** - Pointe Noire
  - Brazzaville (future)
  - Oyo (future)
- **Brasco:** - Brazzaville
  - Pointe Noire

SALES MARKET POTENTIAL CUSTOMER

BREWERY	MEMBER OF THE GROUP	COUNTRY	SALES VOLUME [tonnage/y]		SALES VOLUME [bottles/y]	
Brasco	Heineken / CFAO	Congo	ca.	6.262	ca.	13.514.788
Bralico (point Noire)	Independent	Congo	estimation	3.240	estimation	7.200.000
Bralico (Brazzaville)	Independent	Congo	estimation	3.240	estimation	7.200.000
Bralico (Oyo)	Independent	Congo	estimation	3.240	estimation	7.200.000
Bracongo (RDC)	Castel Groupe	Kinshasa	ca.	4.350	ca.	9.667.357
GSCA Guinness	Castel Groupe	Cameroun	ca.	3.476	ca.	7.725.000
Bralima	Heineken	Kinshasa/Boma	ca.	11.330	ca.	25.179.982
Sobraga	Castel Groupe	Gabon	ca.	8.037	ca.	17.100.000
Soeguibe	Castel Groupe	Equatorial Guinea	ca.	2.289	ca.	5.450.000
		SUM		**45.464**		**100.237.127**

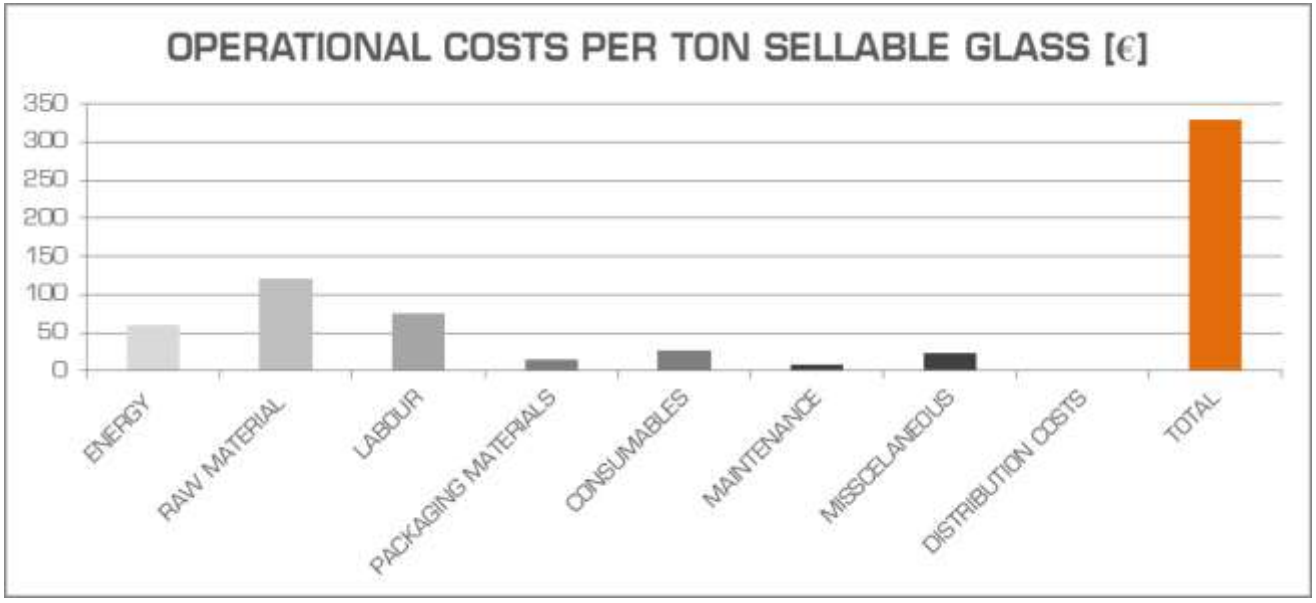
→ Pack to melt estimation 77,5%

→ SCVK‘s estimated salable tonnage for a capacity of **115 tpd** at the beginning → ca. **32.000 t/y**

OPEX - Estimation

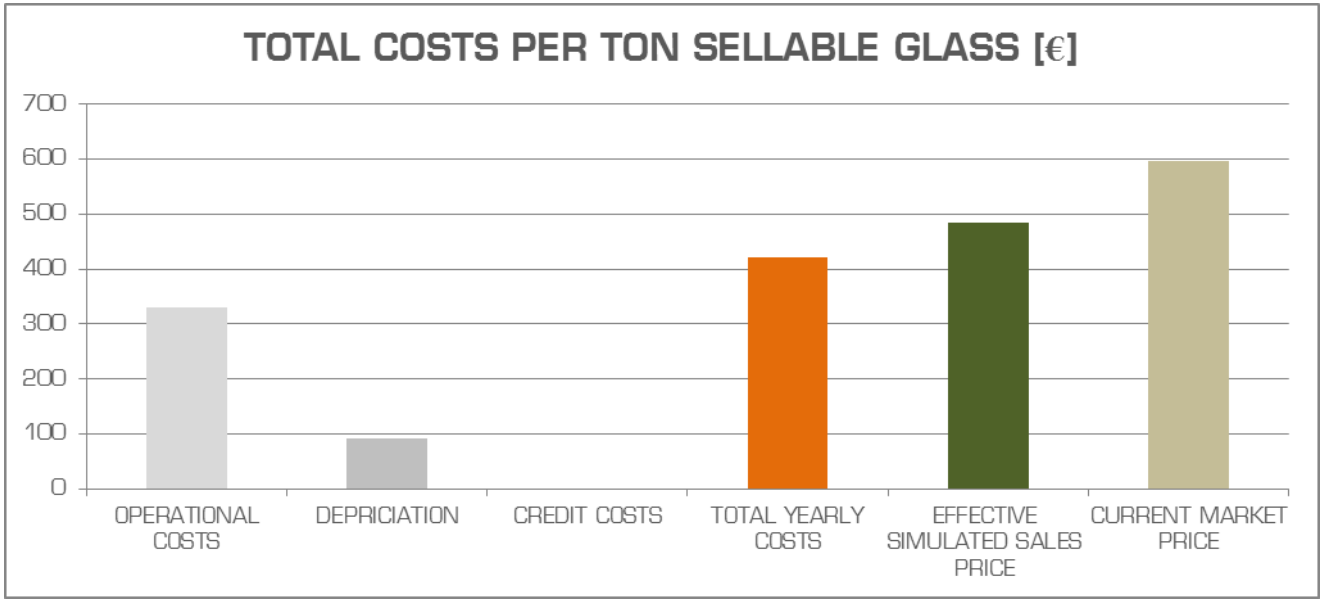
YEARLY OPERATIONAL COSTS

	TOTAL COST [€/ annum]	COST PER SELLABLE TON [€]	% OF TOTAL
ENERGY	1.910.995,53	60,14	18,25
RAW MATERIAL	3.841.006,58	120,87	36,68
LABOUR	2.377.544,00	74,82	22,71
PACKAGING MATERIALS	471.970,27	14,85	4,51
CONSUMABLES	857.767,20	26,99	8,19
MAINTENANCE	260.000,00	8,18	2,48
MISSCELANEOUS	752.000,00	23,66	7,18
DISTRIBUTION COSTS	0,00	0,00	0,00
TOTAL	10.471.283,58	329,51	100,00

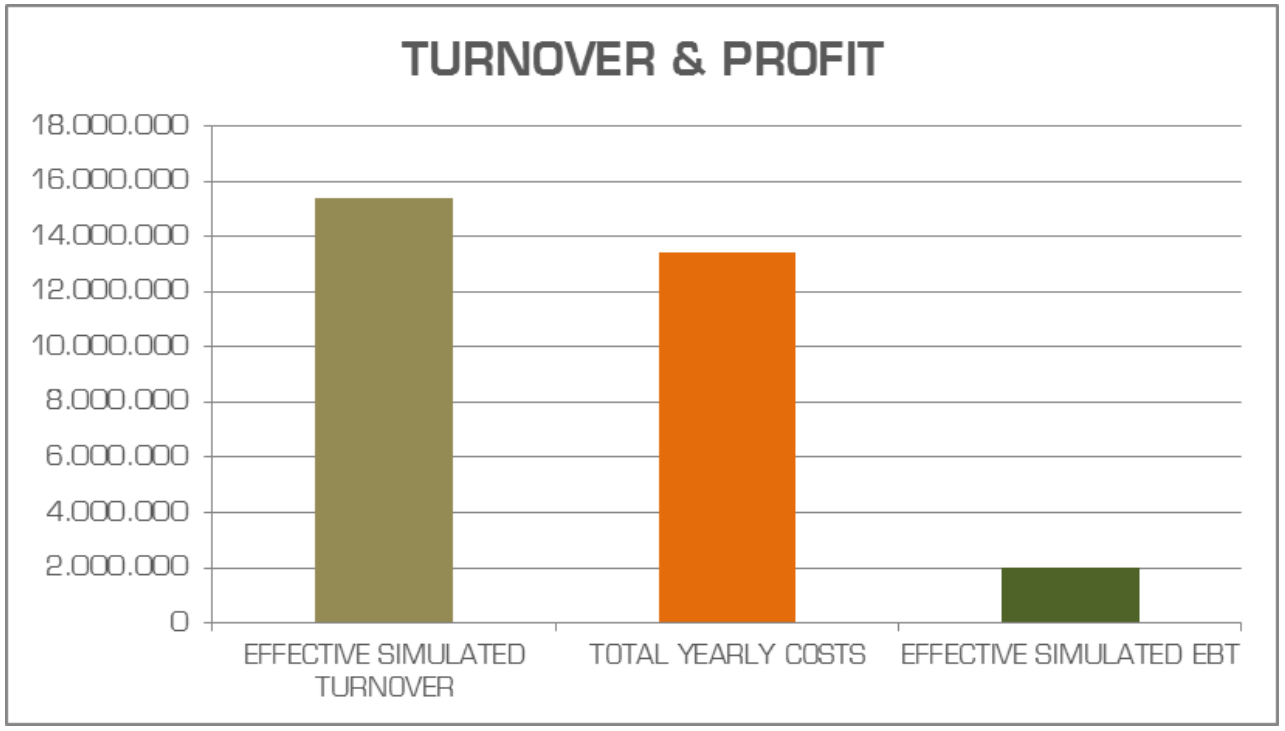


OPEX - Estimation

		TOTAL COST [€/ annum]	COST PER TON [€]
OPERATIONAL COSTS		10.471.283,58	329,51
DEPRICIATION		2.935.101,42	92,36
CREDIT COSTS		0,00	0,00
TOTAL YEARLY COSTS		13.406.385,00	421,87
ESTIMATED PROFIT MARGIN	[%]		15
EFFECTIVE SIMULATED SALES PRICE	[€/ t]		485,15
CURRENT MARKET PRICE	[€/ t]		596,00
EFFECTIVE SIMULATED PTM	[%]		77,51
EFFECTIVE SIMULATED TURNOVER	[€/ a]		15.417.342,75
EFFECTIVE SIMULATED EBT	[€/ a]		2.010.957,75



OPEX - Estimation



OPEX - Estimation

PROFIT & LOSS

CONVERSION FACTOR	1			
		REVENUE	TOTAL [l/a]	15.372.273,65 15.372.273,65
			TOTAL SALES [tons/a]	31.686
			REVENUE/TON [l]	485,15
		OPERATIONAL COSTS	TOTAL [l/a]	10.471.283,58 10.471.283,58
			GROSS PRODUCTION [tons/a]	40.997
			PACK TO MELT [%]	77,51
			SELLABLE PRODUCTION [tons/a]	31.778
EBITDA			[€/a]	4.900.990,07 4.900.990,07
		DEPRICIATION	TOTAL [l/a]	2.935.101,42 2.935.101,42
EBIT			[€/a]	1.965.888,65 1.965.888,65
			PROFIT MARGIN [%]	12,79
		AMORTIZATION & INTERESTS	TOTAL [l/a]	0,00 0,00
		FINANCIAL INCOME	TOTAL [l/a]	0,00 0,00
EBT			[€/a]	1.965.888,65 1.965.888,65

CONGOS'S BENEFITS

Congo's Benefits