N°3901 Jindu Rd, Xinzhuang Industry Park, Shanghai, 201108, CHINA

Project: FIRCHINA New FL Plant

Automatic Warehouse & Internal Logistic Solution

Functional Specifications

Firmenich	FIRCHINA New FL Plant - Zhangjiagang	All information contained in this document should remain "confidential"			
		Creation :	**2016.02.03**	*Author :*	**FLCA**
		Revision :	**1**	*Author :*	**FLCA**
		Plant :	**New FL Plant**		
		Department key user :	**ENGINEERING**		

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Florian CATALANI	Project Engineering Manager		

SUPPLIER APPROVAL

Name	Function	Date	Signature

SOMMAIRE

1. Project description

1.1. Context of the project

Firmenich Aromatics (China) Co., Ltd. (hereinafter referred to as Firmenich) is planning to build a New Flavors Manufacturing Facility in Zhangjiagang, Jiangsu, China to expand their Flavors production capacity in CHINA.

- New liquid compounding facility for liquid Flavors production : PHASE 1
  - Compounding liquid
    - Production Activities
    - Sampling Activities
  - Washoil
  - Emulsion
  - Dish wash
  - Tooth paste Flavour

- New powder facility for powder Flavors production : PHASE 2 (FYXX)
  - Spray drying
  - Cold Blending / SPM
  - Reactions/Paste

The project will be executed in two phases. Find below the evolution of the liquid factory capacity:

		Total	7,429	7,988	8,484		10,057	10,880	11,791	12,775	13,842	14,999	25,000
New Site	Capacity	Permit	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FYXX
Liq+Emul	18,000	18,000				2,117	6,910	7,490	8,113	8,788	9,521	10,314	18,000
Wash	2,330	2,330				318	1,035	1,119	1,208	1,304	1,409	1,521	2,330
SPM	1,800	1,800				-	-	-	-	-	-	-	1,800
Reax	470	470				-	-	-	-	-	-	-	470
SD	2,400	2,400				-	-	-	4	9	15	22	2,400
Sub-Total	25,000	25,000	0	0	0	2,434	7,945	8,608	9,325	10,102	10,944	11,857	25,000
			Phase 1 add liquid compounding and wash oil; warehouse, WWTP, tank farm 12,000 tons/y										
Current Site	Capacity	Permit	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FYXX
Liq+Emul	10,800	2,000	4,871	5,437	5,835	4,233							0
Wash	1,150		770	817	878	636							0
SPM	1,200		862	779	856	940	1,030	1,126	1,229	1,340	1,460	1,592	0
Reax	700		232	246	261	277	294	286	302	318	336	355	0
SD	1,200	1,000	695	709	655	719	788	861	940	1,024	1,117	1,217	0
Sub-Total	15,050	3,000	7,429	7,988	8,484	6,805	2,112	2,272	2,470	2,682	2,913	3,164	0
						9,239							

Liquids Building:

The plant will be designed to manufacture 12'000 Tons with a 80% pours automation rate per year of liquid flavors with capacity to expand in the future to 25'000 Tons per year within the same footprint.

End of PHASE 1, the objective is to reach a 60% pours automation rate for the new liquid compounding factory.

Powders Building:

The powders building will be built during a next Phase (mentioned PHASE 2 in this document).

Automatic Warehouse and internal logistic solution:

A common automatic Warehouse and an internal logistic solution will be integrated first for PHASE 1 for the liquid building and then, expand for PHASE 2 to the powder building.

1.2. Scope of Contract Agreement

The goal of this document is to obtain from your side, a proposal for a Logistic solution PHASE 1 & PHASE 2 which fits with criteria described in this document.

As described in the previous chapter, the logistic project will be executed in two phases. The vendor has to propose a solution which fits with our project expansion, taking in consideration in his solution design, an easy expansion of his solution for fitting end of PHASE 2.

The whole furniture must be designed **Explosion Proof Certified Zone 2.** f

The supplier will deliver appropriate explosion proof certificates **from local Authorities to assure the equipment acceptance permit by EPB authorities at local Provincial and any other level required by GB codes.** 环保局

Indeed, these buildings will be a CLASS A buildings

1.3. Environnement / Implantation

Site	**Firmenich Aromatics (China) Co, Ltd.** Gangfeng Highway Jiangsu Yantgze River International Chemical Industrial Park Zhangjiagang Free Trade Zone Zhangjiagang City Jiangsu Province, People's Republic of China
Building	New liquid compounding facility location

1.4. Macro- Planning

RFP emission ……	**2016.02.04**
Get automatic warehouse specifications…….	**2016.03.18**
Proposal reception……...……...	**2016.04.01**
Logistic Supplier Selection……..……	**2016.06.03**
Detail Design 60% review…….	**2016.06.22**
Official Purchase Order…….……..…….	**2016.08.02**
Detail Design 90% review……..	**2016.08.31**
Installation (Mechanical & Electrical)…..……	**July 2017 to November 2017**
Commissioning…...…….……	**December 2017 to April 2017**
Ready for production...…….……..	**April 2018**

1.5. Project contacts

Project Purchasing Manager:	SHEN Benny Bing:	+86 21 33237712
Project Engineering Manager:	CATALANI Florian:	+86 185 2107 3196

All the mails must be systematically addressed to the two project contacts, written in english.

2. General Specifications

2.1. Design specifications

Room Conditions

- Production area: Food grade

- Temperatures:
  - Production Buildings: 20 – 25°C
    - Warehouse Building:
      - Corridor 1: Between 1°C and 5°C for the highest levels
        Between 5°C and 25°C for the others levels
      - Corridors 2, 3 & 4: Ambient
    - Logistic Building: 20 – 25 C
    - Tunnels: Ambient

- Buildings:

Liquid Building:	Class A
Automatic Warehouse:	Class A
Shipping & Receiving area:	Class C
Debitage area:	Class A
Powder Building:	Class C
Tunnels:	Class C

The system execution complies with current Chinese, NFPA codes, FM Global fire protection requirements & International Health and Safety Regulation for production building.

As mentioned below the whole furniture must be designed **Explosion Proof certified Zone 2**.

At the end of the project, the supplier will deliver appropriate explosion proof certificates **recognized by local Chinese Authorities.**

Firmenich GMP & Quality principles

The solution must be compliance with Firmenich GMP, Quality and Food Safety, Chinese GMP & quality principles.

- Non product contact surfaces inside production area: satin finish or grid 240
- Technical area: Galvanized and painted
- All welds, which are in the production area, have to be flush grounded. All other welds have to be cleaned
- Totally enclosed wiring

2.2. Other Specifications

2.2.1. Safety (equipment)

- The vendor is requested to make its own recommendations regarding the different safety aspects which are obvious to the processes handled.
- Light barriers, initiators etc. are function-supervised. A loss of function generates a local visual and audible local alarm as well as alarm to the HMI of the MES system
- Components, which can store energy, are to be unloaded after an emergency stop of the machine.
  There must be installed an ongoing grounding system for the whole equipment. The liquid workshop will have his own proper earthing/grounding grid. Each single part of the logistic equipment must be tied into it.
- Hinged housings with quarter turn screws should be used
- Loads to be carried manually must not exceed 15kg. If they do, a device must be supplied or recommended for this purpose.
- The design calculations guaranteeing the reliability and safety of the machine and staff will be provided (complies with current Chinese & International regulation)
- At least two fastening points for all assembled mechanical parts (including detector support)
- All hot surfaces will be insulated (in the production area, as in the technical area if required)
- No sparking material
- All electrical and rotary equipment must have appropriate LOTO (lock-out) capability,
- The safety requirements for the logistic solution / equipments for this project in China must be at least the same as safety requirements for a logistic solution / equipment which have a CE certification, with all the risk analysis associated.
  - Emergency button for all the system
  - Emergency button for each individual equipment
  - Safety sensors for each conveyors where a risk of fall down exists for a pallet
  - Barriers with doors and interlock
  - Local visual alarm device when an equipment starts or stops
  - Visual warning device in working area
  - Explosion proof control / monitor system in some strategic activity areas
  - …

2.2.1. Noise

The whole machine – working at its most effective point – does not exceed a noise level max. 72 dB(A).

Noise level measuring protocols are provided by the vendor, following the appropriated GB code testing method, free of charge for the client, with the order confirmation, however latest at the factory acceptance test.

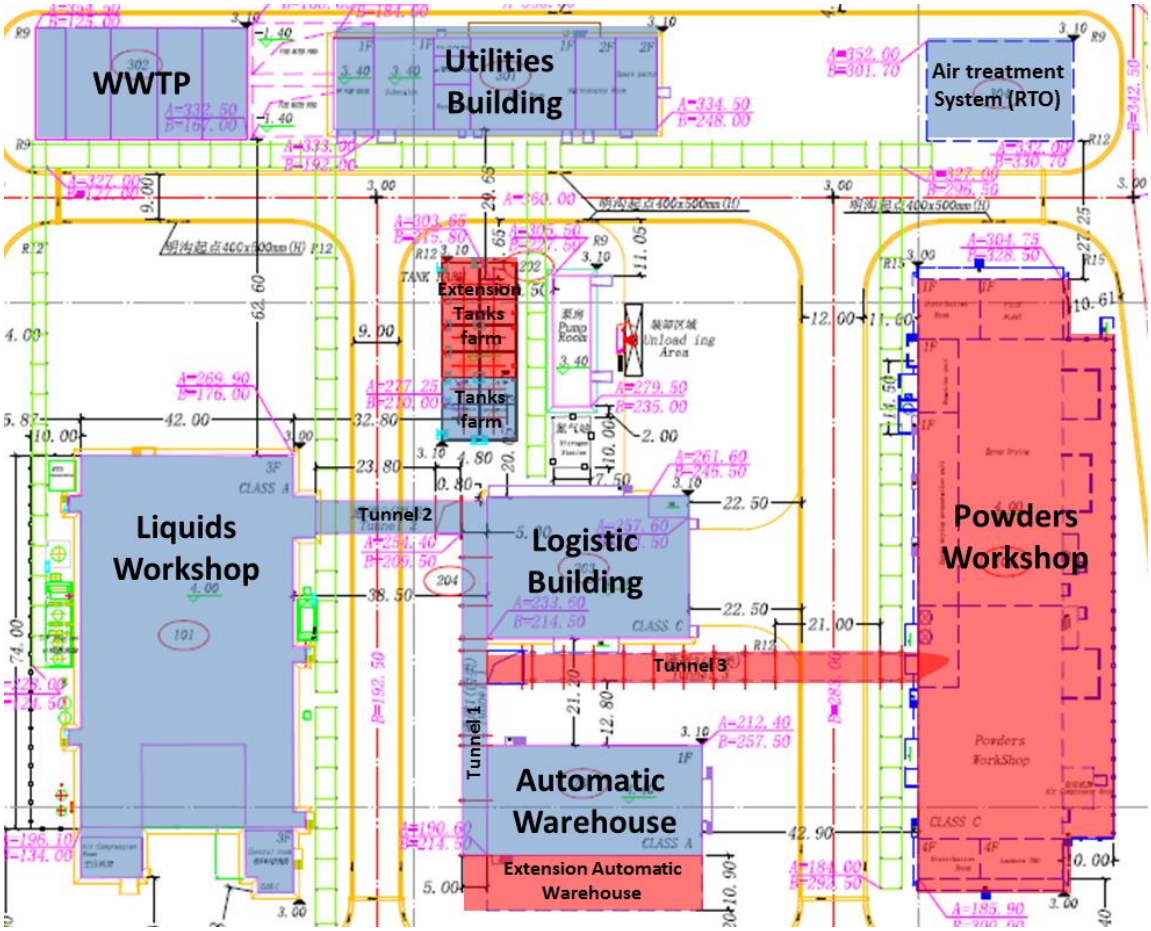
2.2.2. Asbestos

The whole equipment, in each single part, is to be delivered asbestos, lead and mercury free. You assure that neither asbestos, asbestos containing parts (e.g. sealing, insulation material, etc.) nor asbestos containing packaging material is used.

3. Global Project presentation

3.1. Bird view

3.2. GPP



On the layout above, it is showed the phases of the New Flavor Plant construction.

In blue, the 1st phase:

- Building A: Automatic Warehouse ➔ 1000 m^2 / 24 m Height
- Building B: Logistic building
- Building C: Liquids Workshop
- Connection tunnel between Buildings A & B : Tunnel 1
- Connection tunnel between Buildings “A/B” & C : Tunnel 2
- Waste Water treatment plant
- Utilities building
- Air treatment system

In red the 2nd phase:

- Expansion of the Automatic Warehouse ➔ + 500 m^2
- Building D: Powder Building
- Connection tunnel between Buildings “A/B” & D : Tunnel 3

4. Specifications - PHASE 1

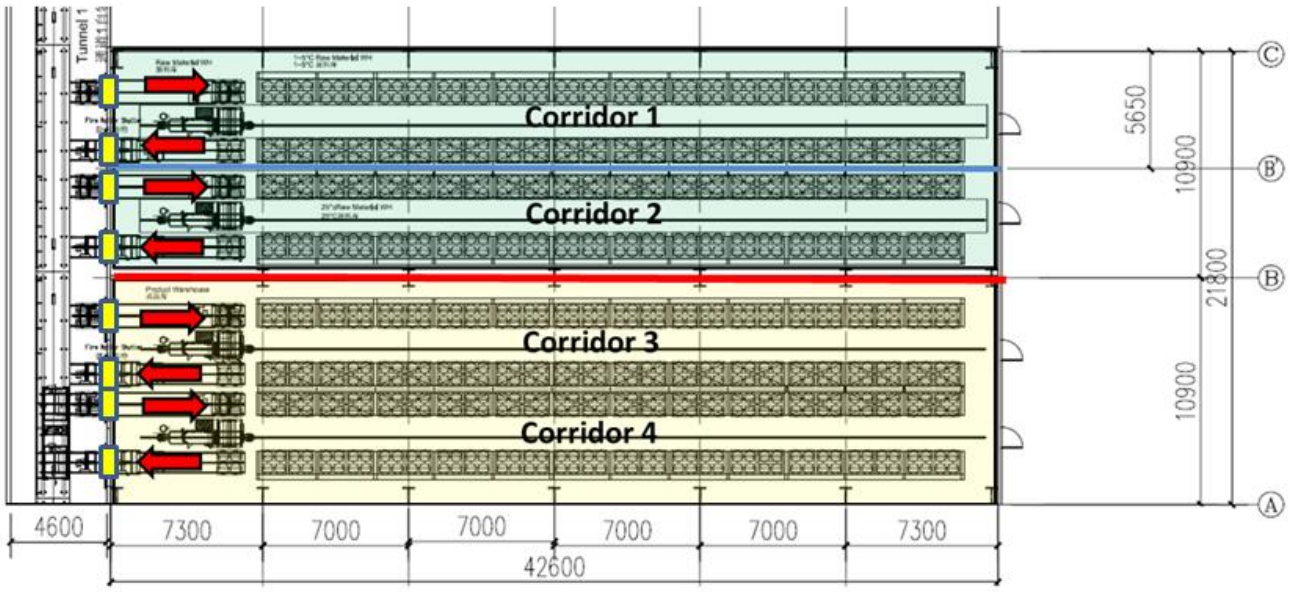
4.1. Capacity specifications for the whole solution

				Pallets flow per day										
Volume Growth					7%	7%	7%	7%	7%	6%	6%	6%	6%	6%
		Pallet type		FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Liquids Plant :														
Receiving Area => Warehouse	Raw Material	1200 x 1200	IN	50	54	57	61	66	70	74	79	84	89	94
	or	**660 x 1200**	**IN**	**85**	**91**	**97**	**104**	**111**	**119**	**126**	**134**	**142**	**151**	**160**
Automatic Warehouse => Liquid Plant	Raw Material		OUT	40	43	46	49	52	56	59	63	67	71	75
Liquid Plant => Warehouse	Raw material		IN	40	43	46	49	52	56	59	63	67	71	75
Automatic Warehouse => Débitage	Raw Material		OUT	70	75	80	86	92	98	104	110	117	124	131
Débitage => Automatic Warehouse	Raw Material		IN	70	75	80	86	92	98	104	110	117	124	131
Débitage => Liquid Plant	Raw Material			30	32	34	37	39	42	45	47	50	53	56
Receiving Area => Automatic Warehouse	Packaging		IN	40	43	46	49	52	56	59	63	67	71	75
Automatic Warehouse => Liquid Plant	Packaging		OUT	40	43	46	49	52	56	59	63	67	71	75
Liquid Plant => Automatic Warehouse	Finish Goods		IN	65	70	74	80	85	91	97	102	109	115	122
Automatic Warehouse => Shipping area	Finish Goods		OUT	65	70	74	80	85	91	97	102	109	115	122
Powders Plant :														**5000 t**
Receiving Area => Warehouse	Raw Material		IN	30	32	34	37	39	42	45	47	50	53	56
Automatic Warehouse => Powder Plant	Raw Material		OUT	30	32	34	37	39	42	45	47	50	53	56
Powder Plant => Warehouse	Raw material		IN	34	36	39	42	45	48	51	54	57	60	64
Automatic Warehouse => Débitage	Raw Material		OUT	30	32	34	37	39	42	45	47	50	53	56
Débitage => Automatic Warehouse	Raw Material		IN	30	32	34	37	39	42	45	47	50	53	56
Débitage => Powder Plant	Raw Material			4	4	5	5	5	6	6	6	7	7	8
Receiving Area => Automatic Warehouse	Packaging		IN	15	16	17	18	20	21	22	24	25	27	28
Automatic Warehouse => Powder Plant	Packaging		OUT	4	4	5	5	5	6	6	6	7	7	8
Powder Plant => Automatic Warehouse	Finish Goods		IN	20	21	23	25	26	28	30	32	33	35	38
Automatic Warehouse => Shipping area	Finish Goods		OUT	40	43	46	49	52	56	59	63	67	71	75

The capacity of the logistic solution should be designed for a 2 shifts working organization (16 hours).

4.2. Warehouse

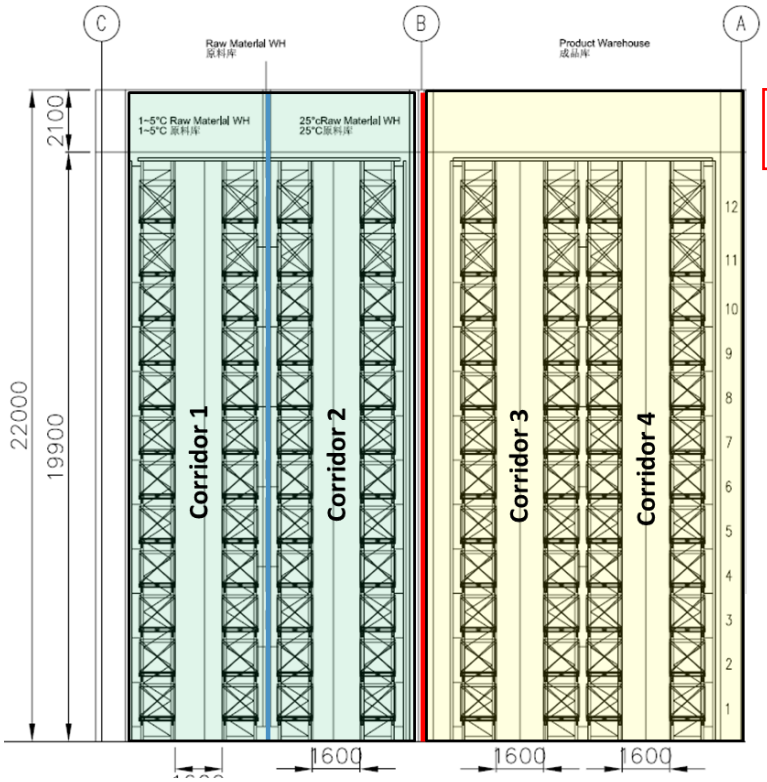
The logistic supplier will propose an automated warehouse and storage systems.



Different pallets size and quality (hood or plastic) will be stored in this automatic warehouse:

- Size: 1200 mm x 1200 mm (plastic)
- Size: 1200 mm x 1200 mm (wood)
- Size : 800 mm X 1200 mm (plastic)
- Size : 800 mm X 1200 mm (wood)
- Size: 660 x 1200 mm (plastic and wood) (should be studied with the logistic supplier to optimize the number of pallets inside the warehouse and optimize the internal logistic flow)
- Weight: Up to 1200 Kg
- Height: Up to 1510 mm

注：托盘尺寸共用5种，最小尺寸的托盘是否使用暂时未定，我们可以提出自己的建议。



注：图中红色为防火墙；蓝色为保温墙。

In red color on the layout above, the automatic warehouse is separated in two different parts by a firewall without hole.

In blue, it is a wall in order to create for the first corridor a controlled temperature area. The concept (not finalized yet), is to get on the highest level a temperature controlled between 1°C and 5°C and for the lowest levels a temperature controlled below 25°C during summer period.

Depending the supplier's portfolio technology, the supplier will propose cranes with the particularity to be able to be transferable easily from one aisle to another one (could fit for corridors 3 & 4 for example).

注：如果技术可行，堆垛机需要能够较容易在巷道间进行转

The racks implementation could be reviewed according the cranes constraints. The footprint building must keep the same.

Some fire doors will be installed (in yellow on the layout above). The conveyors should be designed to accept a full closing of the fire doors. To be coordinated with the project architects.

The logistic supplier will also provide all the racks. Two types of height will be stored in the warehouse, 1150 mm & 1510 mm.

注：托盘高度有1150mm和1510mm两种

4.3. Tunnels 1 and 2

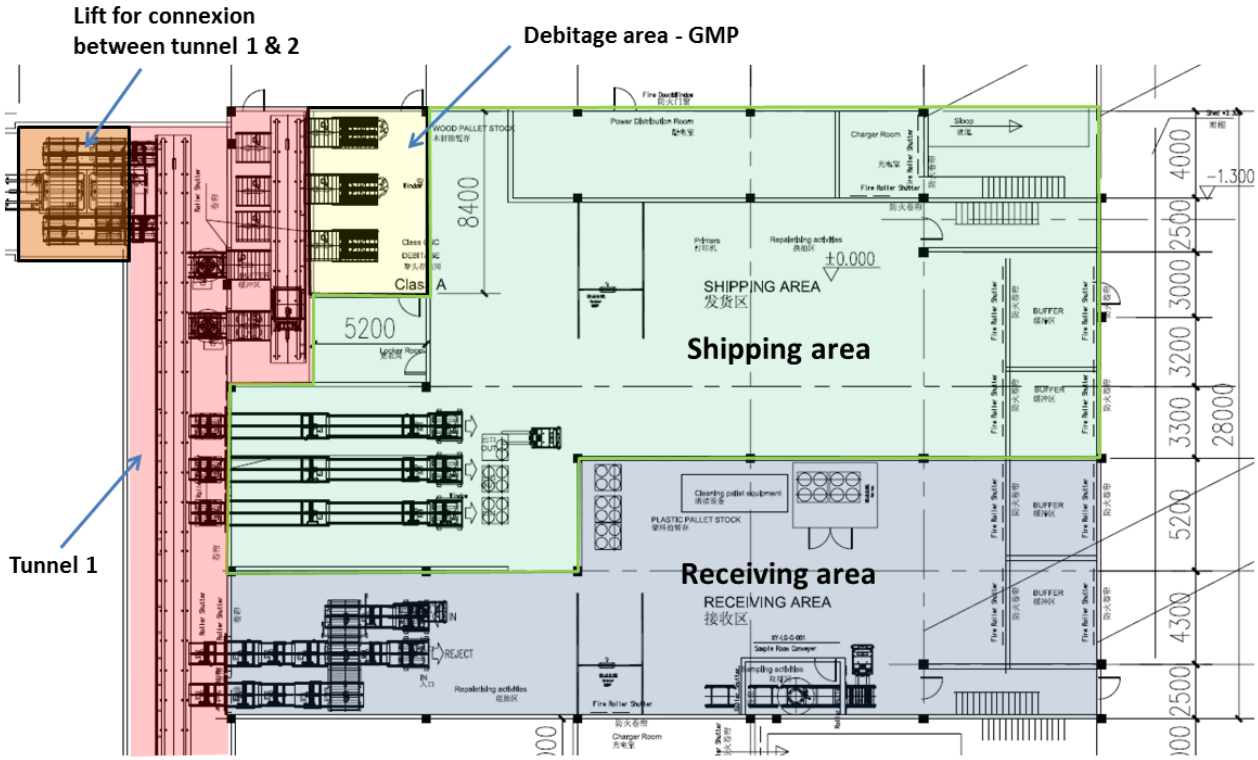
The automatic warehouse will be connected to the logistic building (receiving, debitage and shipping area)by a tunnel => TUNNEL N°1.

The automatic Warehouse & the logistic building will be connected to the Liquids building by another tunnel ➔ TUNNEL N°2.
A vertical conveyor should be installed between the tunnel 1 and the tunnel 2.

Some conveyors will be installed inside the automatic warehouse to allow the connection between the cranes and the tunnel 1. As mentioned in the previous chapter, these conveyors have to be designed in order to accept fire doors closure.
Moreover, an emergency exit will be proposed located just after the automatic warehouse. The purpose of this emergency exit is to be used as a back-up plan if an equipment somewhere is broken. Some other back-up plans should be proposed by the logistic supplier.

A global concept will be proposed and quoted by the logistic supplier. Some buffers positions should be proposed and integrated based on pallets projection flow.

4.4. Logistic activities Building



4.4.1. Receiving area

All the raw materials and packaging pallets will be received in the receiving area. The operators, after administrative operations, will proceed to a pallet replacement for GMP reason. A this step of the project, we do not know yet if we are going to use chemical plastic pallets (1200 mm

x 1200 mm) or smaller specific pallets (660 mm x 1200 mm) for inbound flow in order to optimize the storage capacity inside the automatic warehouse and to facilitate later on the raw materials distribution flow through the plant. This topic should be studied with the logistic supplier.

Then the pallet will be dropped by an operator on a conveyor and transfer to the automatic warehouse. This conveyor will be connected to the Tunnel 1.

注：客户尚未决定在接收区采用哪种托盘，我们需要提出建议。

This conveyor will be equipped with:

- A scanner in order to be able to read the pallet label
- A load cell
- A profile check
- A forklift protection (for each conveyor)

注：传送带需要配备扫描枪、上料单元、轮廓检测、叉车保护。

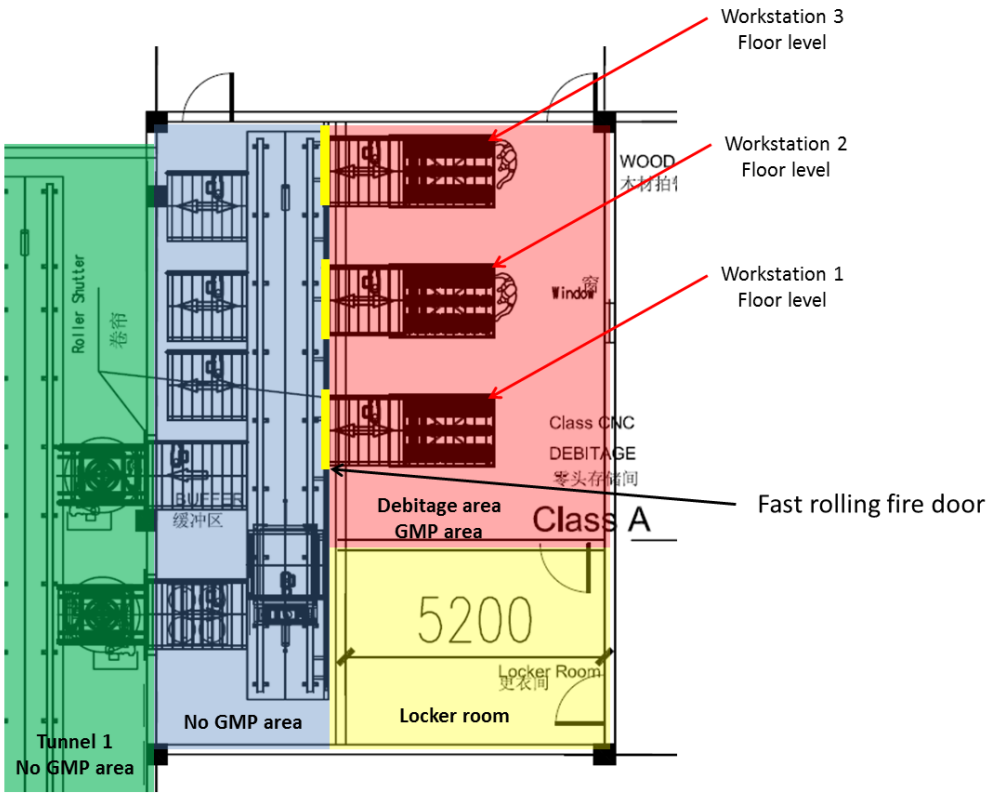
A reject conveyor will be installed in the receiving dock in order to be able to manage some issues during the profile check, scan or weight check.

4.4.2. ***Shipping Area***

In the shipping area, another conveyor will be installed to be able to receive the finish goods pallets from the automatic warehouse. This conveyor will be also equipped with a forklift protection.

Above each conveyor, a screen will be installed in order to give specific information from the informatics system to the operator of the shipping area (which shipment, OBD number, etc). The number of conveyor should be defined by the logistic supplier.

4.4.3. ***Debitage activities***



The debitage activity consists to transfer a material which is in a native packaging to another packaging, mainly smaller.

The debitage activity consist also to pick in a pallet only the packaging required to avoid sending to a final destination unnecessary materials.

The conveyor, on a scissor lift with obstacle detection and anti-trap function, will be also a pallet entry for the logistic solution. The operator should be able to drop a pallet by using a manual handling equipment, that means the conveyor should be at the floor level.

Some pallets prepared by the operator with the requested materials will be directly transferred to the Liquids workshop.

Some fast rolling fire doors or fast rolling and fire doors will be implemented between the tunnel which is a no GMP area and the debitage area which is a GMP area.

The logistic supplier will propose a global solution for these debitage activities.

注：传送带的上料单元需要设计成升降式，方便人工上料

4.5. Liquids Building

4.5.1. Activities presentation

3rd floor Liquids building layout – Raw materials storage:

Raw materials are automatically conveyed from the Automatic Warehouse to the liquid building via the tunnel 2. The internal flow is described in the following chapter.

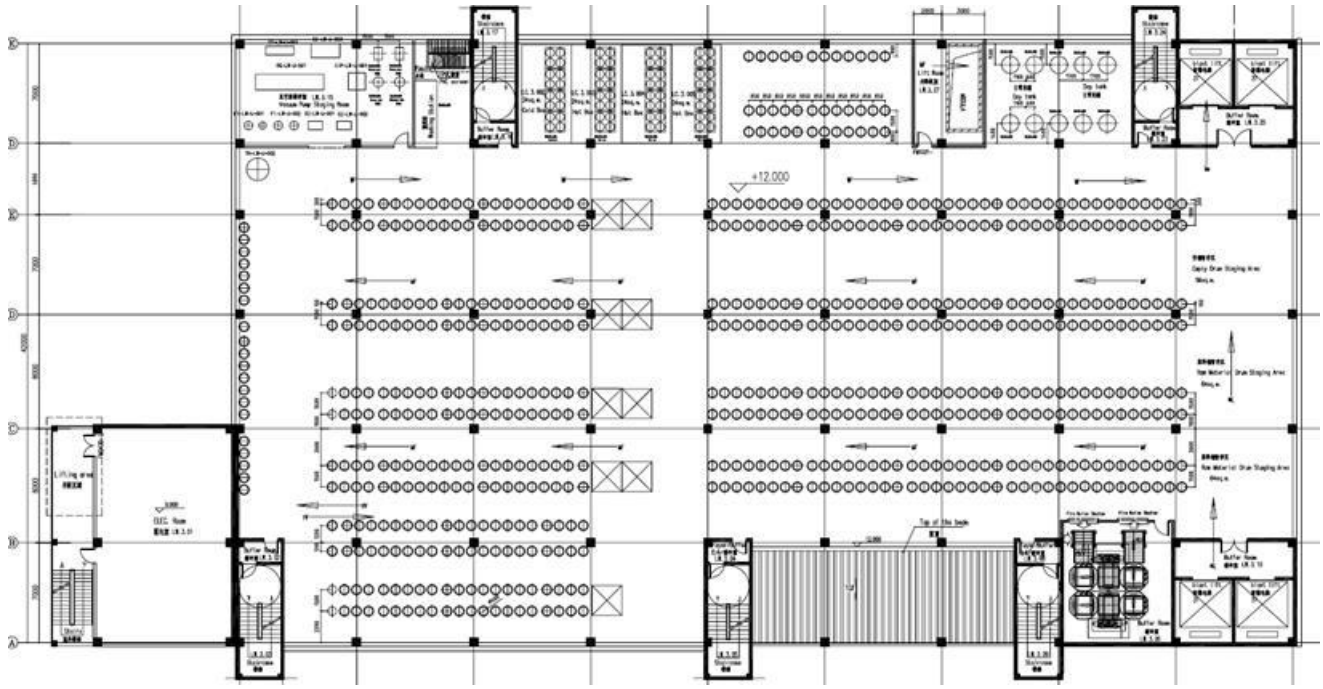
High pour frequency raw materials (Mainly packaged in 215L & 135L drums, 50 kg, 25 Kg, 1000L IBC, etc) are transported automatically to the third floor.

Raw materials in the native packaging are connected to a raw material container which is directly connected to the ACMs installed on the second floor. The approach is to store the raw materials in their native containers in order to minimize internal product transfers.

Some of these raw materials container may have to be located in a hot or a cold room.

A cold room and a hot room will be located at this level. Their positions are not defined yet and will depend on the ACM implementation on the second floor.

Other raw materials (highest consumptions) are stored in a tanks farm and are hard piped to a day tank installed on this 3rd floor. As the raw material container, the day tanks are also directly connected to the ACM's installed at the lower level.



2nd floor Liquids building layout – Manual & Automatic compounding activities

Automatic compounding activities:

Raw materials containers and day tanks are connected to a large automatic compounding machine, which is installed on the second floor, by pipes, utilizing a gravity flow concept.

A small automatic compounding machine is also installed on the second floor. This ACM has his own local storage area (low pours frequency raw materials).

The ACMs are able to automatically dose the corresponding raw material in a mobile tank, specifically designed to pass through the ACM dosing valves, where the correct quantities of raw materials is added.

Manual compounding activities:

On this floor, fixed compounding tanks with heating and cooling functions will be located for process order from 200 Kg up to 5000 Kg.

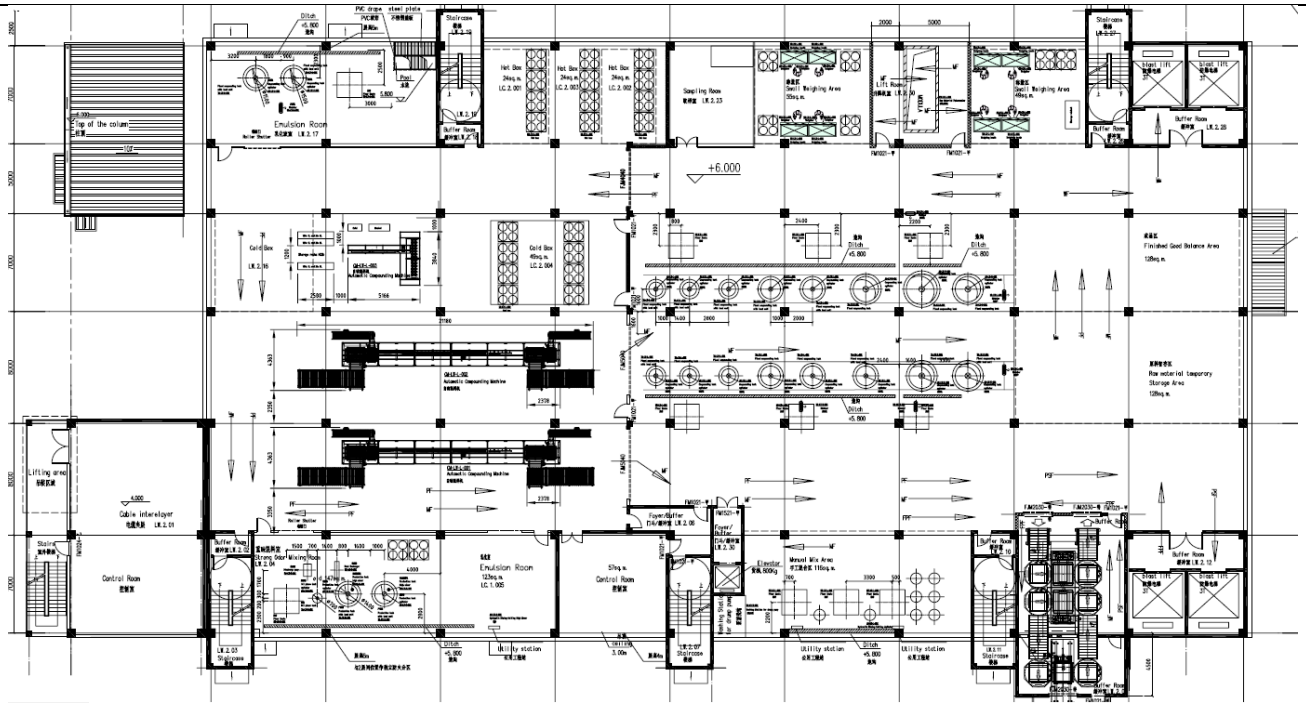
These fixed tanks will be connected to a central CIP system.

For process order around 200 Kg, some mobile tanks will be used. Depending the ACM solution which will be selected, the range of what we will be able to produce with the mobile tanks will change.

Mobile tanks will have their own washing station connected to the central CIP system.

In order to be able to heat up or cool the product inside the mobile tank, it will be possible to connect the mobile tanks to a utilities docking station.

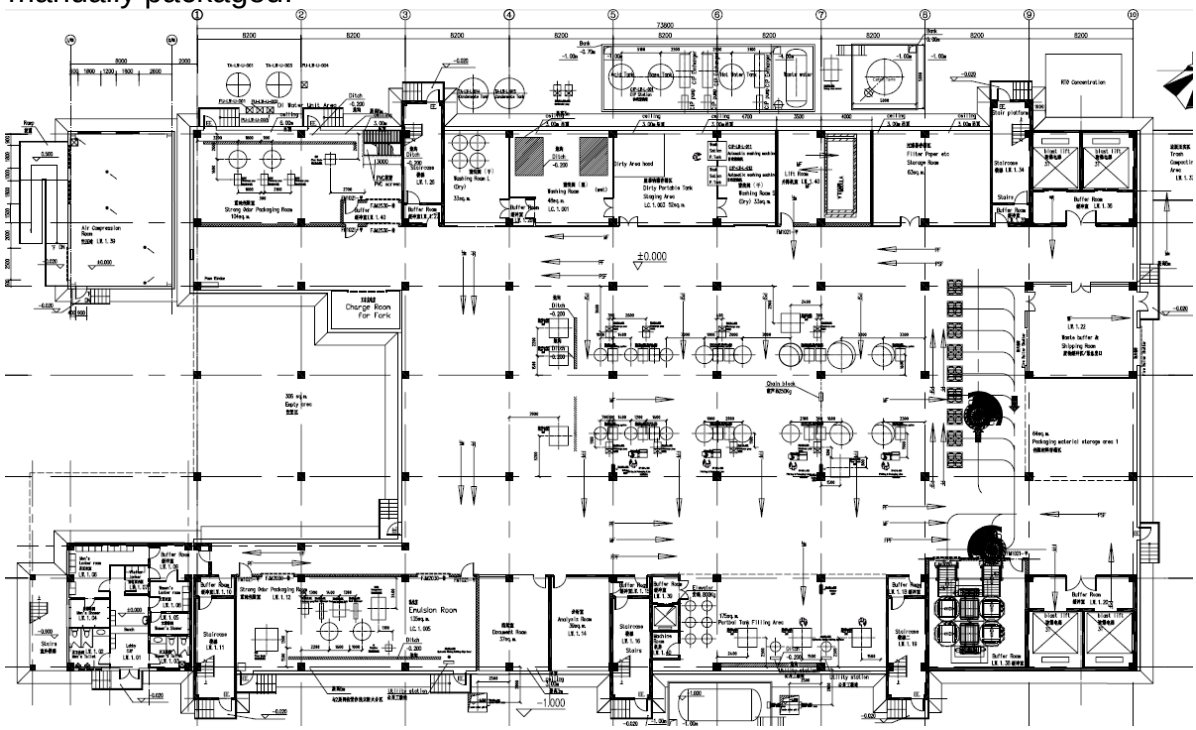
Mobile tanks will be unloaded into the fixed tanks by using the gravity flow process.



Ground floor Liquids building layout – Filling & Packaging activities

Automatic and manual packaging machine are located at the ground floor depending the process order size. The product in the fixed tanks is packaged in the ground floor, flowing by gravity through filter.

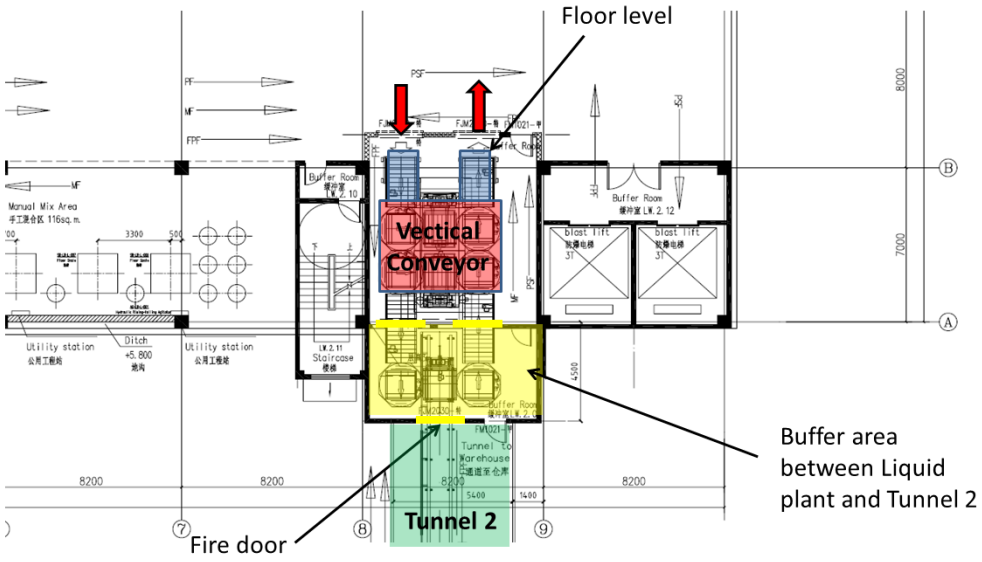
Mobile tanks full of product are transported from second floor to first floor through a lift and then be manually packaged.



4.5.2. Vertical conveyor

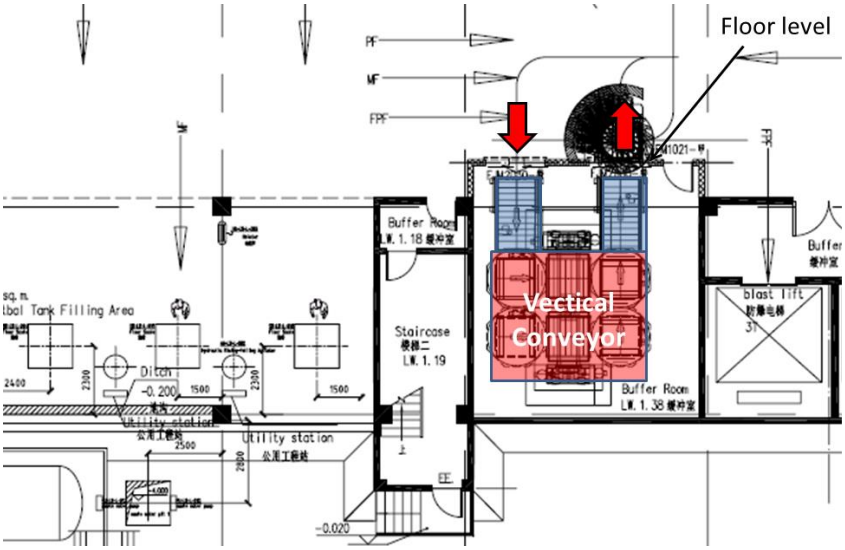
注：通道2连接到液体车间的2楼，液体车间2楼与3楼之间使用垂直的传送装置，此垂直传送装置贯穿1/2/3楼

The tunnel 2 arrives on the second floor.
A vertical conveyor will be installed to serve the 3 floors of the building.

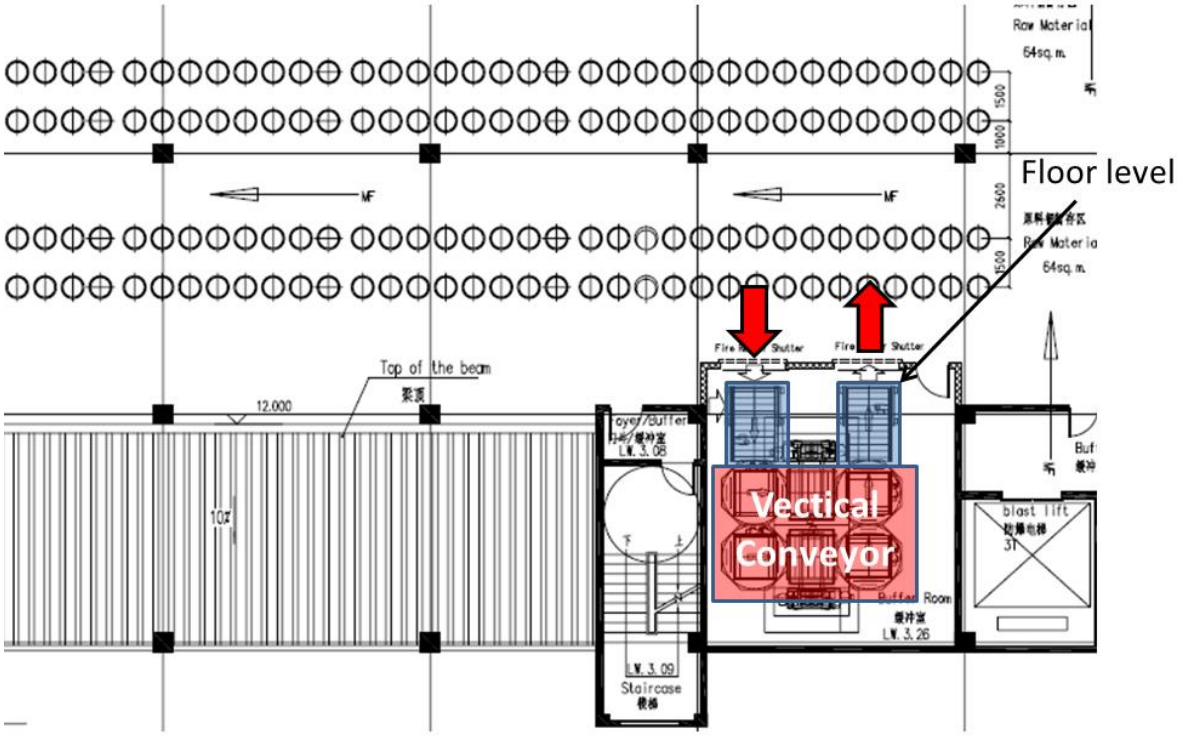


2nd floor

A buffer area is required between the tunnel 2 area and the liquid workshop. Some fast rolling fire doors or fast rolling and fire doors will be implemented. The logistic solution has to be designed accordingly.
Moreover, inside the liquids workshop, Firmenich wants to avoid the using of forklift within the plant. Therefore, the drop and pick conveyors should be at the floor level in order to be able to use manual handling equipment. The pallet should be presented to the operator with the opening side.
As mentioned below, this vertical conveyor will be implemented through the 3rd, 2nd floor and the 1st floor.



1st floor



3rd floor

Loading and unloading conveyors will be installed on each floor for each lift. As mentioned previously, Firmenich wants to avoid the using of forklift within the plant. Therefore, the drop and pick conveyors should be at the floor level for all the floors in order to be able to use manual handling equipment.

Pallets will be presented to the operator by the logistic system with the opening side. A screen above each single pick conveyor will be installed in order to show the pallet destination or the origin of the request (information from the informatics system.

The building layout will be reviewed during the detail design according the logistic solution selected.

托盘信息将通过物流系统的开放性终端呈现给操作者。每个接货传送带上方将安装屏幕以显示托盘的目的地或原始指令要求（信息的来源与信息系统）。

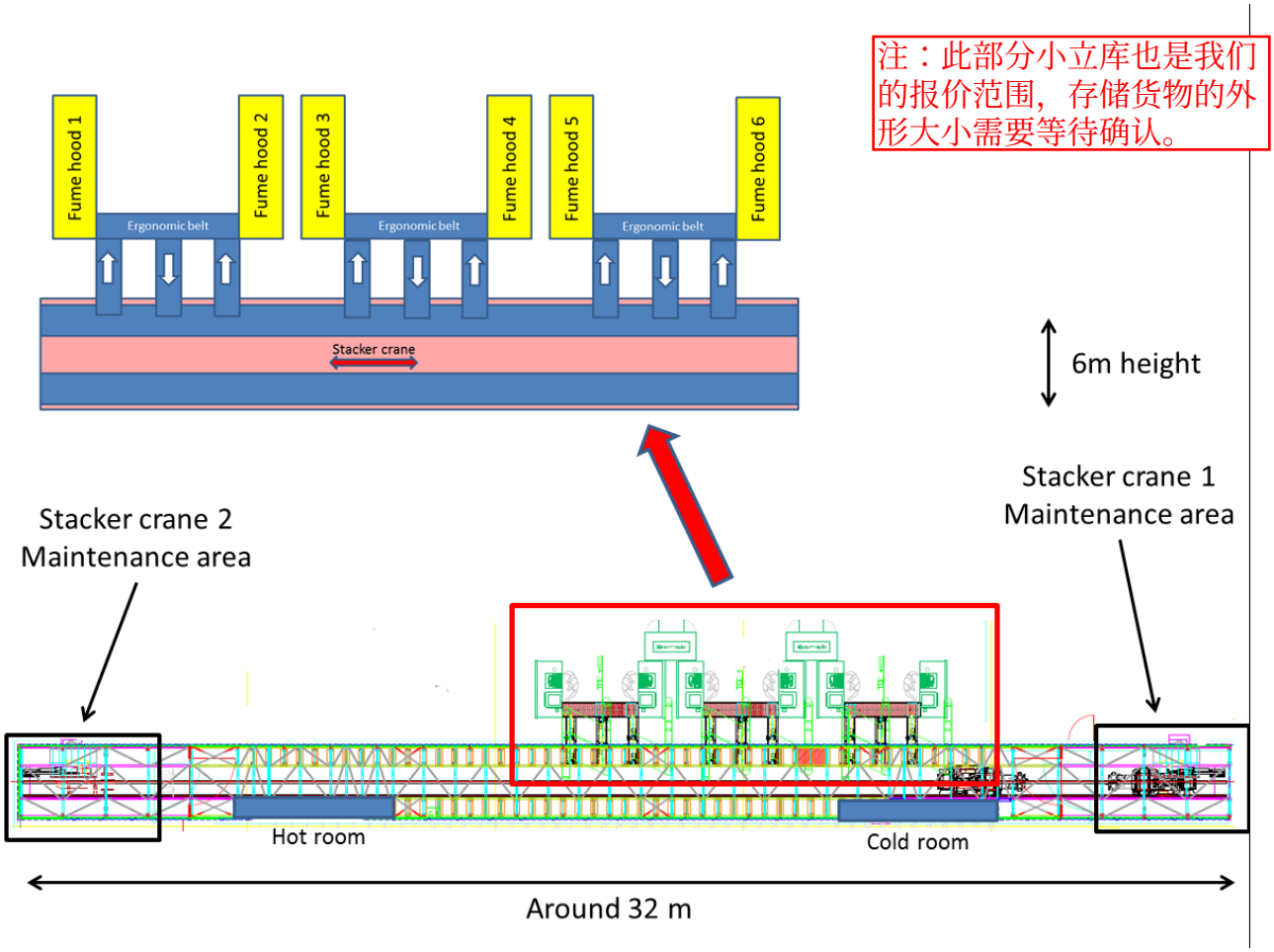
4.5.3. Mini-Warehouse

On the second floor, a mini-warehouse will be implemented to improve the efficiency of the small manual compounding area (pours < 5Kg).
In this mini-warehouse, a cold room will be located and also a hot room with fast rolling doors.
6 workstations will be connected to this mini-warehouse. In the future it will be possible to add new workstation easily.
The conveyors system in front of the fume hoods should be optimized. The logistic supplier will propose an optimize solution.
Raw materials will be stored in this mini-warehouse. Small packaging will be stored inside a plastic tray which will be compartmented.
Compartmented plastic trays are fully part of the whole supplier scope.

Two small stacker cranes will be proposed.
The purpose is to have a stacker crane as a back-up in case of a failure of the other one.

In term of capacity, the mini-warehouse will be able to achieve:

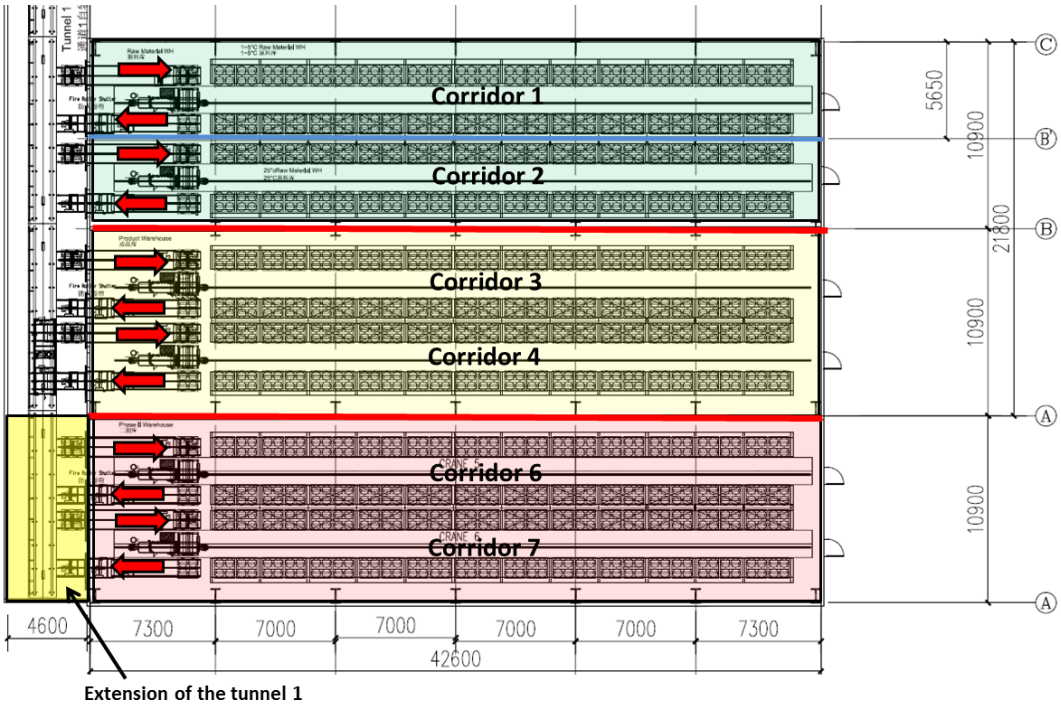
- 1500 drop per day (3 shifts organization)
- 1500 pick per day (3 shifts organization)
- Storage capacity : around 1500 compartmented plastic trays – Package size up to 25Kg



5. Specifications - PHASE 2

As described in a previous chapter, during the Phase 2, it is planned to build a new powder building. At the same time, we will have to extend the logistic solution to be able to supply this new facility.

5.1. Warehouse



The logistic supplier, during his conceptual design will take in consideration the future extension of the layout (Corridors 6 and 7).

An estimated cost will be indicated in his proposal. It will be able to do this extension without impacting the activity of the liquid manufacture which will be already in production.

5.2. Tunnels

An additional tunnel (Tunnel 3) will be implemented to connect the logistic buildings to the powder building (Layout in the chapter 3. GPP – Phases 1 & 2 presentation). A vertical conveyor will be integrated between the tunnel 1 and the tunnel 3.

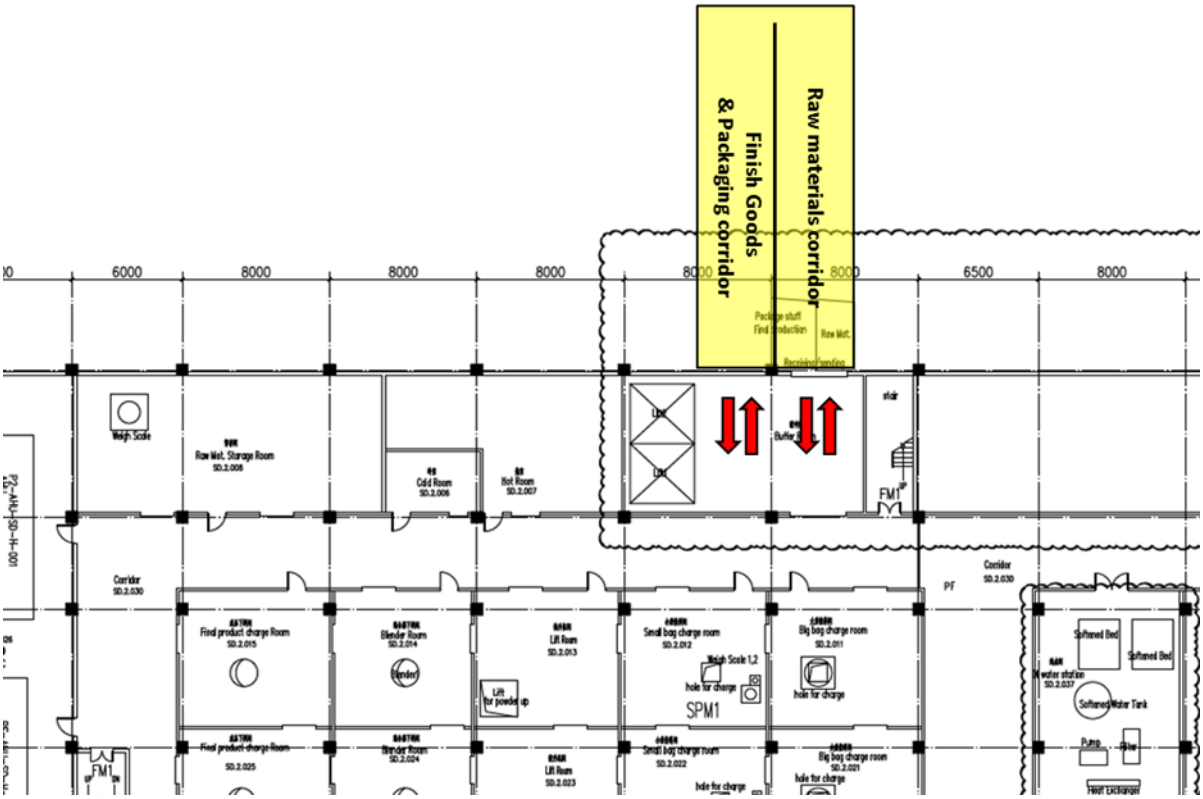
.

The tunnel 1 will be also extended.

The logistic supplier, during his conceptual design will take in consideration the future extension of the layout. An estimated cost will be indicated in his proposal.

It will be able to do this extension without impacting the activity of the liquid manufacture.

5.3. Powders Building



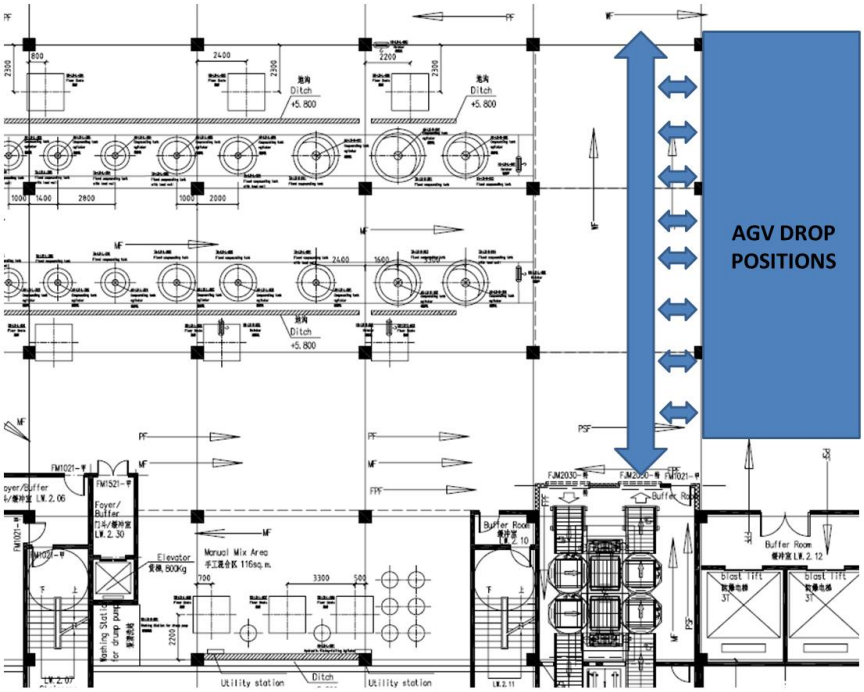
注：通道3连接粉末车间的2楼。

The tunnel 3 will be implemented on the second floor. Loading and unloading conveyors will be installed at this level. The conveyor level will be at the floor level to allow the using of manual handling equipment.

The logistic supplier, during his conceptual design will take in consideration the future extension of the layout. An estimated cost will be indicated in his proposal.

It will be able to do this extension without impacting the activity of the liquid manufacture.

6. AGV – Liquid Building – 2nd floor



In his proposal, the logistic supplier will propose 1 AGV.

This AGV will organize the raw materials pallets per process order in the staging area (AGV drop positions on the drawing above).

This AGV is also required Ex-proof zone 2 certified.

7. IS

The solution must be able to interface with a MES supervisory system, and SAP WM and LE modules receive and send commands and data. The system must be able to identify materials by internal numbering system and recognize some characteristics to perform a segregation logic for the placement of materials inside the WH.

Statistical data of the logistics operations must be relayed to the MES data collection system for further information, identification of bottlenecks and continuous improvement of the integrated solution.

7.1. Raw materials receiving

The system must record the GR number of containers weight and internal material number .It must be able to transmit GR confirmation to SAP.

For FG receiving to the WH from the manufacturing area:

The system must receive information of Batch # number of containers and weight. All weights to be confirmed with a tolerance by the on line scales in the transfer conveying system.

7.2. Raw material debitage

The system must be able to receive a raw material request and deliver to the debitage area the proper amount in a FIFO concept weights to be confirmed at the delivery from Warehouse to Debitage area. Overstock will be returned to the WH system must confirm the weight after debitage with a tolerance to be defined Inventory must be kept in the system with a WIP status until usage confirmation is received from SAP or MES system.

7.3. Shipping Pick and Pack

System will receive a picking order from SAP it must be able to deliver from the warehouse to the shipping area the correct material number, batch and quantity, once shipment confirmation done in SAP system must be able to receive a message and subtract from inventory

7.4. Cycle counting

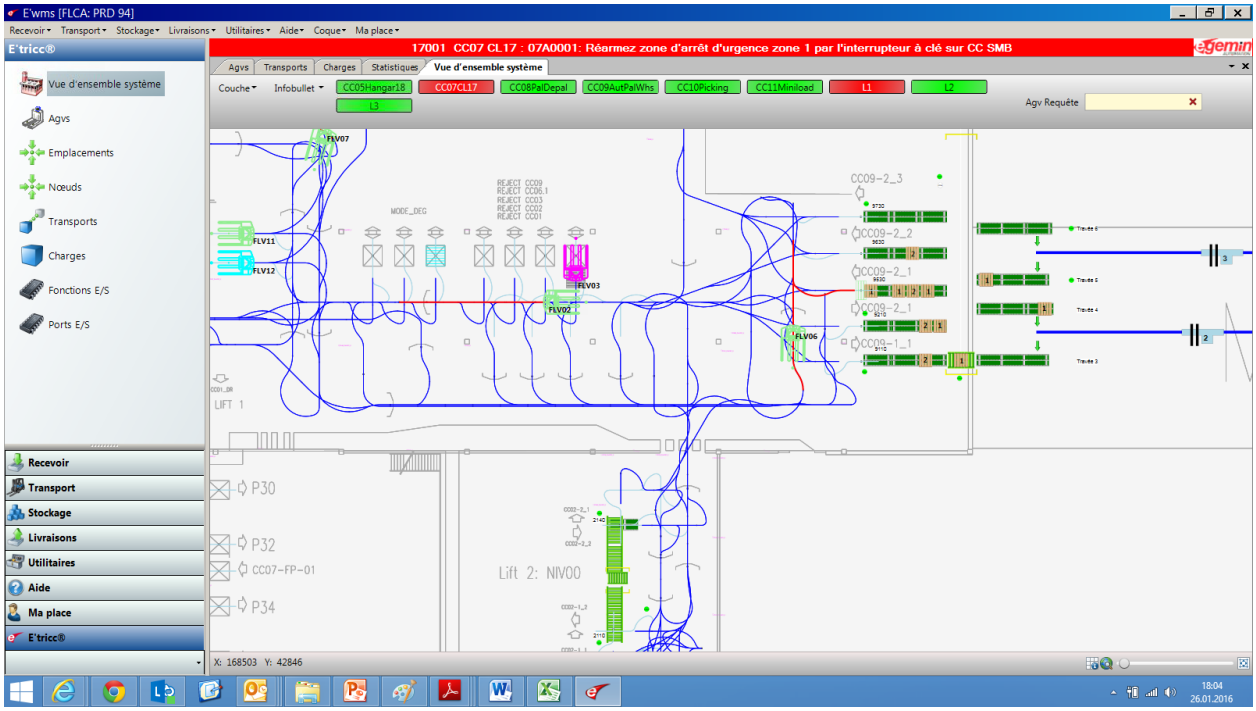
As the system verifies weights in, and out of the warehouse and receives usage confirmation of FG and RM it must be able to reconciliate a cycle counting module in SAP

8. Warehouse management system requirements

⇨ Chinese and English languages

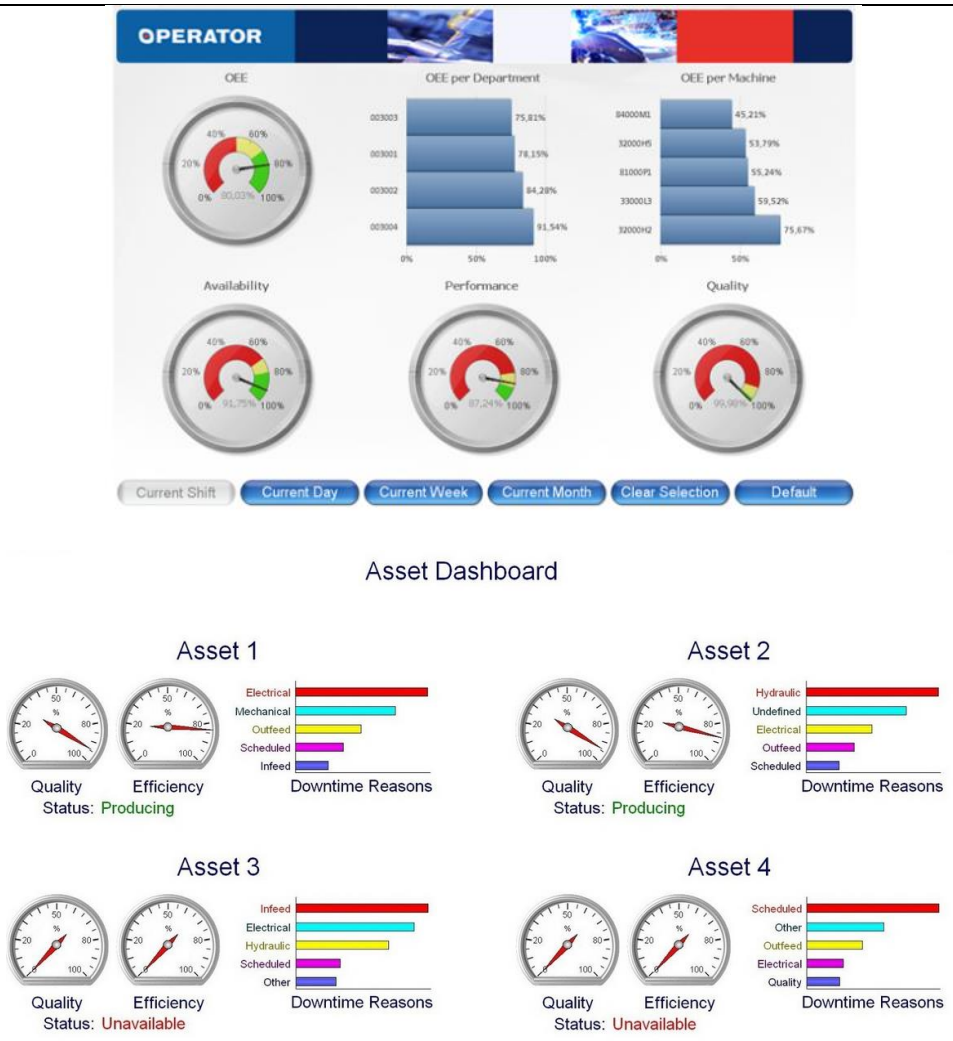
- Supervision

The supplier will provide a standard solution to be able to visualize in live the equipment of the logistic solution, pallet flows, equipment's defaults, warning, etc. Different authority with different use level will be provided.



Example for supervision

- Statistic module to be able to get :
  - List of errors
  - Time to fix an error
  - Number of pallet flow per day for each single point of the logistic solution
  - Overall Equipment Effectiveness (OEE) of each single equipment
  - …



Example for OEE dashboards

With his proposal, the supplier will deliver a detail document explaining the different capability of his global standard warehouse management system.

9. Receipt and "qualification"

9.1. Qualification

FAT:制造现场验收试验

SAT:客户现场验收试验

Supplier will deliver FAT & SAT protocols for each installation of his solution including the IS integration with SAP and MES.

注：验收标准及协议由我们提出

9.2. Training

Tackled issues will concern (for production & maintenance technicians and by function for WMS):

- Mounting / dismounting operations;
- Troubleshooting
- The application; starting up; settings;
- The cleaning;
- The maintenance (instructions; maintenance frequencies…);
- The metrology (tools to check; operating mode).

At the end of the training, a certificate of training have to be written; it will mention:

- The name and the function of the person which animates the training;
- A description of the contents of the training;
- The duration of the training.

This attestation will be signed by the trainer and by the trained person. Training has to be performed in Chinese language.

The supplier should specified in the proposal the number of training hours proposed.

注：培训时间需要特别指出

9.3. Performances

The supplier guaranties a good functioning its whole equipment at the nominal cadence (chapters 4.1 and 4.5.3 for the mini-warehouse), without any sensor default or other errors during 2 weeks with a 3 shifts organization.

注：设备标准负荷试运行期间，必须保证两周时间内（3班制）没有传感器错误或其他错误。

In the proposal, the supplier will specified the nominal capacity for each single part of his global installation.

注：单个设备的标称能力需要特别指出

10. Frame of answer

Your best offer of price and of delay is to put back to the service purchase in duplicate for the attention of:

SHEN Benny Bing (phone): +86-21-33237712
CATALANI Florian (phone): +86 185 2107 3196

at the latest 2016-04-01.

This offer must be the most detailed possible (**Prices breakdown list**) and will have to include the following points:

- The estimated delivery time for the whole equipment and an estimated time schedule for executing this project (installation period and explosion proof certificates process included),
- The functional and technical detailed description of the proposed solution,
- The layout drawings, including implantation (Draft-version), P&ID (Draft- version)
- The options and the calculated and detail variants,
- The cost of the commissioning,
- The cost for the spare parts for one year,
- The details and hand of work guarantee,
- The cost of the FAT / SAT (protocol & execution),
- The utilities to be provided (electricity, water, air) with estimated consumptions and type of connection,
- The cost to participate to the equipment risk analysis at Firmenich Plant (5 days)
- The cost to participate to the detail design 60% review (3 days)
- The cost to participate to the detail design 90% review (3 days)
- The cost for the support on site of an engineer during 1 year (ramp-up period)
- The contract with comments highlighted

The vendor has to guarantee a service within 24-hours from the local Agent, 48 hours if a specialist from Europe/US is needed.

The service concept (mechanical part and IS part) has to be described exactly as a part of the quotation and quoted.

The vendor has to deliver the following warranties:

- 24 months
- Quality Bank Guarantee

A security of supply for stocks of electrical, mechanical, hydraulic, automation and industrial data processing spare parts for a period of 10 years without redeveloping the application or mechanical modification.

It must be possible to carry out all preventive maintenance operations or replace wear parts in under 7 hours.

The choice of spare parts to be ordered will be made after analysis of potential failure of the parts. An analysis report equivalent to a FMECA type analysis will be supplied.

Tools will be provided to allow all parts to be removed for regular maintenance or for replacement of wear parts.

The vendor provides the different steps of site activities until SAT under his own responsibility

- Unloading
  Including cranes, hoisting devices, chain blocks and frames
- Installation (mechanical & electrical)
  Including pipes (with insulation), hoses, cables and pneumatic pipes and hoses
  The vendor has to carry out a Safety Management on the construction site.
  The vendor will specify if he will assign the installation to local installation vendors.
- Commissioning :
  - Testing procedures of every single part of the equipment
  - Testing with energies
  - The vendor has to pronounce when energies/media will be needed
- Start-UP/ run
- Training (maintenance & production technicians). Training “support” will be provided.
- SAT (documented completion of scope of work)
- Documentation such as (not exhaustive)
  - Operators manual in Chinese
  - Maintenance manual in Chinese
  - Drawings
  - PID

Communication requirements:

The supplier must be able to use **Lync** to facilitate communication during the bid process and the project execution.

During the bidding process, all the mails must be systematically addressed to the two project contacts, written in english.

The project team must be able to communicate in English (written & spoken)

Payment:

M90 days payment, or go through Letter of credit. CIF Shanghai port.

Breakpoints:

At a breakpoint the supplier has to submit the below described documents to FIRMENICH for approval, marked with “G” in list in Chapter 12 After the approval, these documents will follow a change control process. All changes have to be described by the supplier and have to be approved again by FIRMENICH.
The aim of the submission and approval of documents is to ensure the information and coordination between supplier and FIRMENICH and not to detect engineering failures. Therefore the approval of FIRMENICH has no impact to the supplier responsibility for design, function and warranty.

Breakpoint 1: Order Confirmation

Latest two weeks after the order the supplier has to submit the documents listed in chapter 12., marked with “1” together with the order confirmation.

Breakpoint 2: End of Detail Engineering

At the defined date the supplier has to submit the documents listed in chapter 12., marked with “2” to FIRMENICH. After this review the supplier starts with manufacturing.

Breakpoint 3: Factory Acceptance Test (FAT)

The vendor is responsible for preparation and execution of the FAT. The plant has to be tested before shipment at the vendor site.
The FAT comprises documented tests, whose content has to be agreed between supplier and FIRMENICH early enough before. The supplier provides the FAT protocols and FIRMENICH has to approve these protocols, at minimum 3 weeks before FAT.
All tests during FAT are executed and documented by supplier employees in presence of FIRMENICH according to the equipment qualification SOP. The technical documentation of the complete system must be available at the FAT.
The FAT covers tests as far as possible and reasonable.
The risk analysis established for the equipment shall be reviewed during the FAT test.
All deviations found during the FAT have to be documented in a punch list. All critical or major issues have to be resolved before delivery.
At least a period of 3 “resolving weeks” must be integrated in the supplier planning between the FAT and the shipment.
The results of FAT are listed in a report. This report has to be approved by supplier and FIRMENICH.

Breakpoint 4: Site Acceptance Test (SAT)

After installation and start-up on FIRMENICH site executed by supplier employees the technical site acceptance test has to be done.
The SAT comprises documented tests, whose content has to be agreed between supplier and FIRMENICH early enough before. The supplier provides the SAT-protocols and FIRMENICH has to approve these protocols, at minimum 3 weeks before SAT.
All tests during SAT are executed and documented by supplier employees in presence of FIRMENICH.
Tests already done during the FAT must not be repeated if the transportation and the onsite installation have no impact on the significance of the FAT results.
The risk analysis established for the equipment shall be reviewed during the SAT test.
The SAT is completed when all agreed tests are executed successful. Minor deviations should be solved maximum 3 weeks after SAT.
The results of SAT are listed in a report. This report has to be approved by supplier and FIRMENICH.
This milestone is equivalent to the handover of the responsibility for the system from the supplier to FIRMENICH.

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11. Prices breakdown structure for equipments

注：报价需要按两个阶段分开来报。

11.1. PHASE 1

- Cranes for the Automatic Warehouse,
- Conveyors In and Out in front of the automatic Warehouse (x 2),
- Racks,
- Labeled pallets
- Tunnel 1,
- Tunnel 2,
- Vertical conveyor for connexion between Tunnel 1 and Tunnel 2,
- Debitage solution (3 working stations),
- Conveyors in the receiving area,
- Conveyors in the shipping area,
- Vertical conveyors inside the liquid workshop and his conveyors,
- Mini warehouse
- AGV implementation
- IS solution

11.2. PHASE 2

- Extension of the automatic warehouse (crane, conveyors, racks, labeled pallets),
- Extension of the tunnel 1,
- Implementation of the tunnel 3,
- Conveyors in the powders building,
- Extension of the IS solution.

11.3. Other points – Only PHASE 1 concerned

- The cost of the commissioning,
- The cost for the spare parts for one year,
- The cost of the FAT / SAT (protocol & execution),
- The cost to participate to the equipment risk analysis at Firmenich Plant (5 days),
- The cost to participate to the 60% review – 3 day
- The cost to participate to the detail design 90% review – 3 days
- The cost for the unloading,
- The cost for the installation (mechanical & electrical),
- The cost for the commissioning,
- The cost for the Start-UP/ run,
- The cost for the training (maintenance & production technicians).
- The cost for the support on site of an engineer during 1 year (ramp-up period)

12. Listing of the documentation

	Document:	Format	Language	Breakpoints / Milestone
	Quality and Project Plan - G		En	1
	Specifying needs of all energy resources including list of electrical consumption points		En	2
	Equipment's Functional analysis G Equipment's Specifications - G WMS Functional analysis - G WMS specifications - G	.Word	En	2
	Layout : - General layout of the equipments -G - Detail layout of the equipments - G - Assembly diagram - Electrical diagram and pneumatic diagram	.dwg	En	2
	Parts list including equipment / sensor / actor list based on the P&ID incl. supplier and type in detail	Excel	En	2
	Safety analysis of vendor - G	Excel	En & local	2
	Hardware Design Specification (HDS) - G Software Design Specification (SDS) - G Functional Specification (FS / FDS) - G	Word / pdf	En	2
	Wiring diagrams, terminal plans, cable list, parts list (BOM), cabinet layout		En & local	2
	FAT protocol: - Protocol minimum 3 weeks before - Report maximum 2 weeks after the tests		En	3
	Calibration procedure and certificates		En & local	3
	Manual for commissioning, operation and decommissioning as well as for trouble shooting	Word	En & local	3
	SAT protocol : - Protocol minimum 3 weeks before - Report maximum 2 weeks after the tests		En	4
	Declaration of conformity or examination certificates		En & local	4
	Maintenance and inspection plans	Word	En & local	4
	Equipment manuals / descriptions of all purchased components (including electrical components mounted in cabinets): - user manual - cleaning manual - maintenance manual		En & Local	4

	Document:	Format	Language	Breakpoints / Milestone
	- list of measuring devices available on the equipment (type, range, resolution)			
	Spare parts lists (including manufacturer, ordering-no. of the manufacturer)		En	4
	List of all lubricants		En	4
	List of special tools and service utilities		En	4
	Parameter settings (see text)		En & local	4
	List of installed software : - Process automation hardware and software tests - 2 copies of the hardware and software (DVD support) - Functional, technical and hardware specifications - Program source code included in DVD - A sufficiently detailed level of documentation to allow all types of electrical, mechanical, hydraulic, pneumatic, industrial data processing or automation faults to be diagnosed - Safety hard wire and software interlocks document matrix - Software and hard ware fail code list with remediate actions		En & local	
	Ex-Proof certificates from local Authorities to assure the equipment acceptance permit by EPB authorities at local Provincial and any other level required by GB codes.		local	4
	As build documentation	3 copies + CD		At go-live

All points not clearly specified <u>"not included"</u> in a dedicated chapter in the supplier quotation and which are mentioned in this technical specifications document <u>will be included</u>.