MELISSA

Memorandum of Understanding
TOS-MCT/2002/3161/In/Cl

Prop 092-02 from ADERSA to UAB

TECHNICAL NOTE : 66.51

Technical Database of MELISSA

Draft Version : 1
Issue : 1

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SUMMARY

FIGURE LIST

1. PRELIMINARIES

1.1 Document historical record

Date	Version	Issue	Author	Up to date object
2002/09/27	1	0	JL Testud JP Laurier	Creation Draft Version
	1	1	N. Braunwald	

1.2 List of the modified pages

All pages from this edition are located at the last document index

Without object for this edition

1.3 ADERSA contacts

People in charge of :

- Functional aspects,
  - Jean-Louis TESTUD (01.60.13.53.37)
- Technical aspects concerning process,
  - Jean-Joseph LECLERCQ (01.60.13.53.27)
- Technical aspects concerning industrial coding,
  - Azzedine BAHET (01.60.13.53.40)
  - Ninon BRAUNWALD (01.60.13.53.52)

1.4 Document structure

Chapter 2 contains document presentation.
Chapter 3 contains a remind of the MELISSA context.
Chapter 4 provides results of database updating with views of database after modifications.
Chapter 5 contains a guide of main functionality necessary for database manipulation.
Chapter 6 presents all components shapes available in drawings.
Chapter 7 presents the update's conclusion.
Chapter 8 is about the following phases of the work.

A Visio file is provided with this technical note. This file contains the last technical database version. It is called : MELISSA_021024_ADERSA.vsd
Please, open it with Visio Pro 2002.

2. INTRODUCTION

2.1 Document aim

This technical note is made for MELISSA Partners and particularly the UAB and for NTE.

This memo's aim is the evaluation by UAB of the last technical database update.

This update consists in modifications of the Nitrifying compartment technical drawing (CIII).

ADERSA purpose will be to extend those modifications to all others compartments drawings, after validation of Nitrifying compartment drawing.

2.2 Reminders about database purpose

The database purpose consists in providing a solution to information exchange problem occurred between MELISSA project partners.

This solution needs a two times approach :

- First step : information normalisation,
- Second step : information centralisation.

The normalisation consisted in the choice of a common language for technical drawings built with the Microsoft Visio software. Each MELISSA loop compartment is represented with one drawing. The development of such drawings conduced to choose :

- a common symbol list for representing compartment's components,
- a common naming way for each component,
- a common parameters list for each component.

Centralisation step is not already reached. It should consist in a database laying by ADERSA and fed with modified Visio drawings coming from partners.

The database has to reflect the actual composition of the Pilot Plant for both equipment and interconnections.

2.3 Time Schedule

This time schedule will be composed of three steps :

- First step : Nitrifying Compartment drawing update
- Second step : Other compartment drawings update
- Third step : Technical database regular update

2.3.1 First step : Nitrifying Compartment drawing update

This step is made of three understeps :

1. First understep : Sending of database (MELISSA_$yy_1mm_1dd_1$_ADERSA.vsd) to UAB for evaluation and return to ADERSA (MELISSA_$yy_1mm_1dd_1$_UAB_01.vsd).
   UAB's evaluation tasks :
   a. Check equipment composition of Nitrifying Compartment.
   b. Check links between components.
   c. Check and complete component's personal properties.

2. Second understep : Taking into account of UAB remarks, by ADERSA, verification of process.

3. Third understep : Sending of the database to all partners. This database (MELISSA_$yy_2mm_2dd_2$_ADERSA.vsd) owns an updated Nitrifying Compartment validated by UAB.

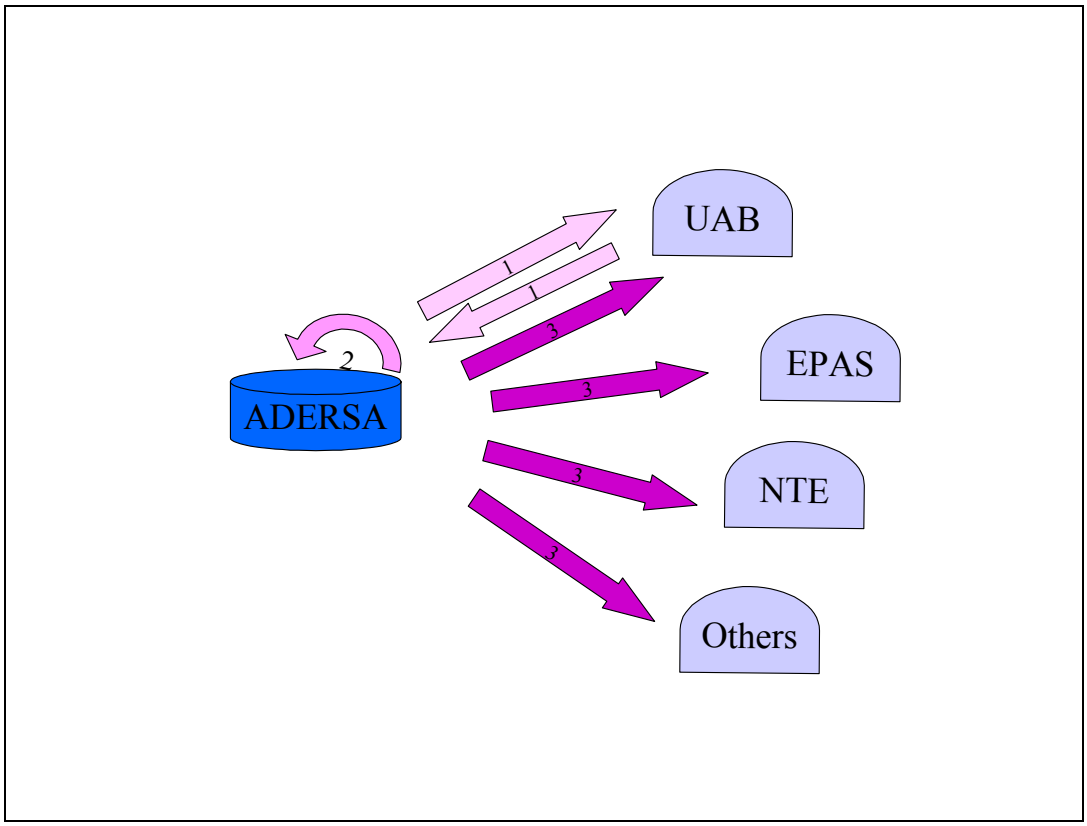


Figure 1 : Schedule of the nitrifying compartment drawing update

2.3.2 Second step : other compartment drawings update

This step is made of three understeps :

1. First understep : Generalisation of Nitrifying Compartment update, to all compartments.
2. Second understep : Diffusion to all MELISSA partners for evaluation (same evaluation content than for Nitrifying Compartment). And return to ADERSA for reviewing.
3. Third understep : Correction of all MELISSA loop compartments by ADERSA.

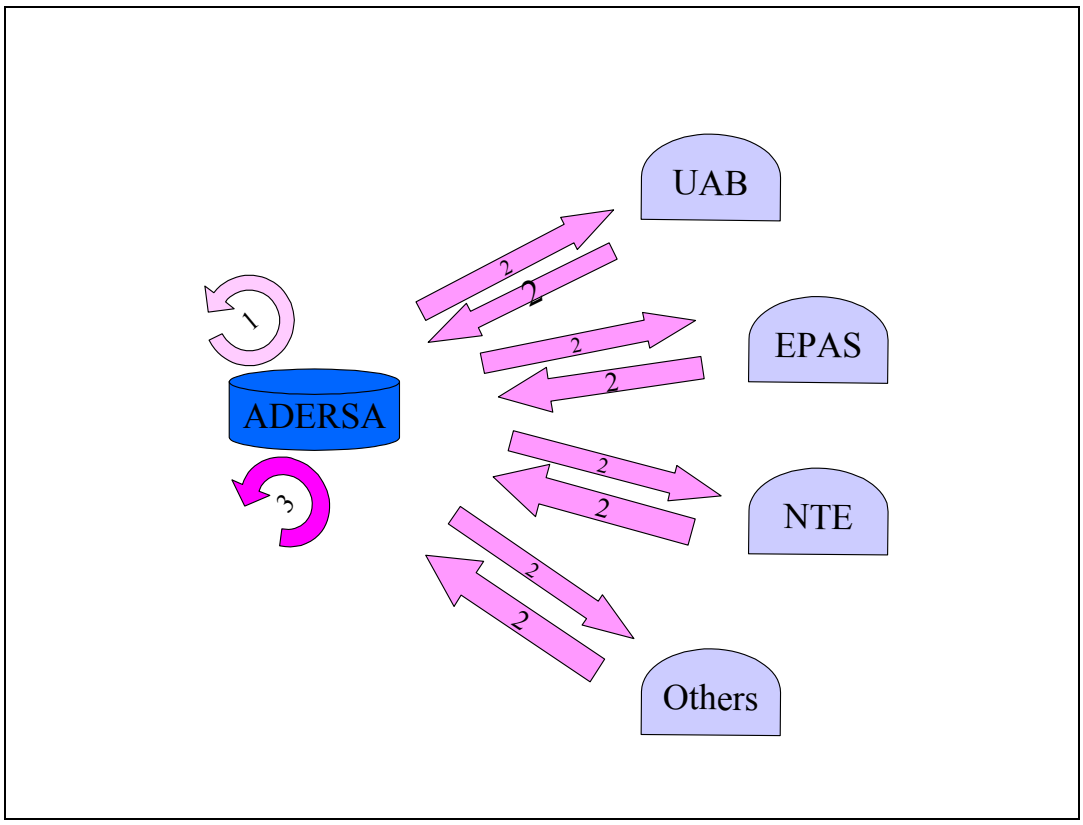


Figure 2 : Schedule of the other compartment drawings update

2.3.3 Third step : technical database regular update

This step represents the normal way of using the database which is composed of three understeps :

1. First understep : Sending of different database versions by partners to ADERSA (MELISSA_yy$_1$mm$_1$dd$_1$_UAB_01.vsd, MELISSA_yy$_1$mm$_1$dd$_1$_EAPS_01.vsd …).

2. Second understep : Creation by ADERSA of an updated database taking into account all modifications made by partners (MELISSA_yy$_2$mm$_2$dd$_2$_ADERSA.vsd).

3. Third understep : Diffusion of this common updated database to all MELISSA partners.

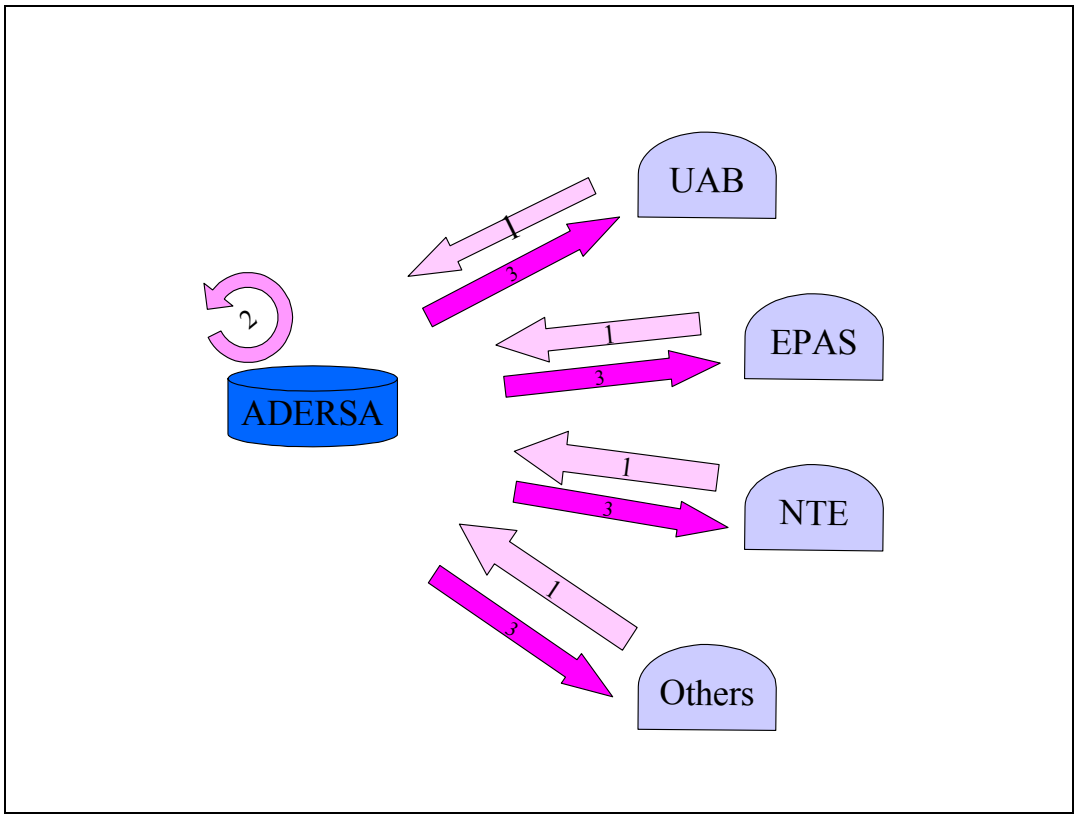


Figure 3 : Schedule of the technical database regular update

2.4 Technical Database file naming rules

Those rules will enable ADERSA to update effectively database.

2.4.1 Database produced by ADERSA

Each file name produced by ADERSA, will be built on the model :

MELISSA_yymmdd_ADERSA.vsd

Example : MELISSA_021024_ADERSA.vsd

2.4.2 Database produced by a MELISSA partner

Each file name produced by a partner, will be built on the model :

MELISSA_<yymmdd ADERSA file modif.>_<PARTNER'S NAME>_<modification version>.vsd

Example : MELISSA_021024_UAB_01.vsd which means "first modification of the technical database modified by ADERSA on the 7th October 2002".

2.5 Applicable document

- ADERSA Documents
  - TN 62.7

2.6 Reference documents

- ADERSA Documents
  - TN 62.7
  - TN 62.9
- NTE Documents
  - TN 72.002
- UAB Documents
  - Julio PEREZ's thesis
- ADERSA Database Visio file

3. DESCRIPTION REMINDERS OF THE MELISSA LOOP

MELISSA project (Micro Ecological Life Support System Alternative) is developed by the European Space Agency (ESA) for an ecosystem mainly based on the microorganisms. It claims to be a tool for artificial ecosystem understanding and for a next LIFE SUPPORT SYSTEM for long spatial flights (Mergeay and al, 1988).

The MELISSA project is based on the edible biomass recovery from wastage, CO2 and minerals and using the light as energy source for photosynthesis.

The process is composed of 5 sub-systems (called compartments) strongly interconnected through liquid, solid or gas exchanges. These material exchanges are shown on graphic representation in order to materialise existing links between sub-systems. The crew compartment (COMP 5) mainly consists of human staff that consumes oxygen and biomass and produces waste and CO2. Other compartments are made with the necessary elements for the waste reprocessing and the production of nutritive elements and oxygen (bioreactors, separators …)

The diagrams below describe the main loop and links organisation.

MELiSSA Advanced Loop Concept

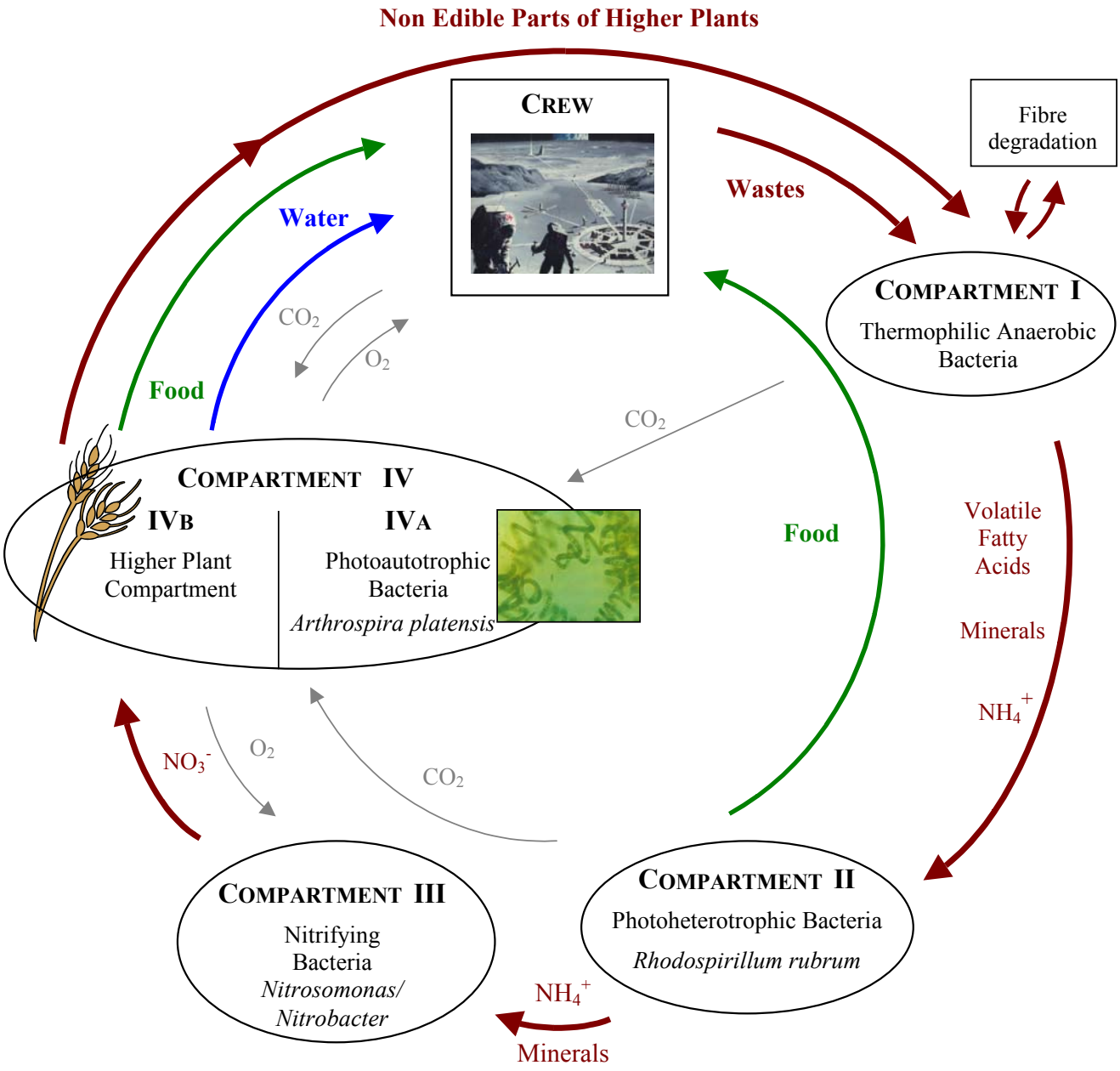


Figure 4 : Principle schema of the MELISSA loop (from Lattenmayer)

4. DRAWING'S COMPONENTS CODING RULES

Each component's name is built on the same model :

C<compartment number in Roman numerals>_ <component's name>_ <component's number>

Examples : CIII_sensor_01
CIII_sensor_02
CIII_sensor_03
CIII_sensor_04

5. DATABASE VIEW

5.1 Global MELISSA loop

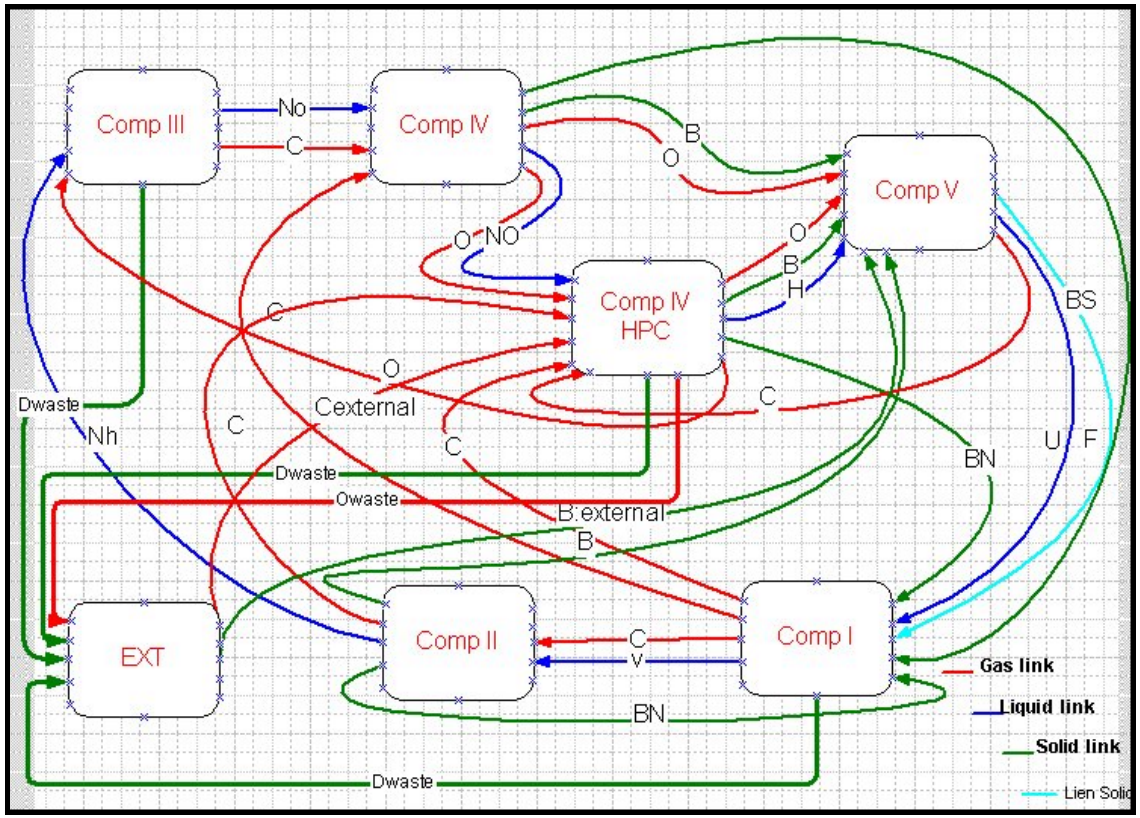


Figure 5 : Global MELISSA loop drawing

cf. Appendix C : Nomenclature table

On this drawing, for each represented compartment, entries are on a side while exits are on the opposite side.
Waste exits are always on the bottom side of the compartment.
Double click on a compartment enables to display the associated drawing.

UAB tasks: (help in APPENDIX A)

1. *Check global loop composition.*
2. *Check links between compartments.*
3. *Check and complete compartment's personal properties.*

5.1.1 Description of links between compartments of MELISSA Loop

cf. Appendix C : Nomenclature table

links between compartments of MELISSA loop		Comp. I	Comp. II	Comp. III	Comp. IV	Comp. IV HPC	Comp. 0	EXT
Comp. I	One input from		BN		BS	BN	U + F	
5x5	One output to		C + V		C	C		D
Comp. II	One input from	C + V						
2x4	One output to	BN		Nh		C	B	
Comp. III	One input from		Nh			O		
2x3	One output to				No + C			D
Comp. IV	One input from	C		No + C				
3x5	One output to	BS				No + O	B + O	
Comp. IV HP	One input from	C	C		No + O		C	C
6x7	One output to	BN		O			B + O + H	O+D
Comp 0	One input from		B		B + O	B + O + H		B
7x3	One output to	U + F				C		
EXT	One input from	D		D		O+D		
4x2	One output to					C	B	

Figure 6 : Description of links between the MELISSA Loop compartments

UAB tasks:
Check links between compartments.

5.1.2 Description of the flows between MELISSA Loop compartments

(UAB tasks: Check links type between compartments.)

Type of link	From	To		Term used in M3C
C	I	II	Gas - CO2	CI_CII_CO2
C	I	IV	Gas - CO2	CI_CIV_CO2
C	I	IV HP	Gas - CO2	CI_CIVHP_CO2
C	0	IV HP	Gas - CO2	C0_CIVHP_CO2
C	II	IV HP	Gas - CO2	CII_CIVHP_CO2
C	III	IV	Gas - CO2	CIII_CIV_CO2
O	IV	IV HP	Gas - O2	CIV_CIVHP_O2
O	IV	0	Gas - O2	CIV_C0_O2
O	IV HP	0	Gas - O2	CIVHP_C0_O2
O	IV HP	III	Gas - O2	CIVHP_CIII_O2
C	EXT	IVHP	Gas - CO2	EXT_CIVHP_CO2
O	IVHP	EXT	Gas - O2	CIVHP_EXT_O2
U	0	I	Liquid - URINE	C0_CI_URINE
V	I	II	Liquid - Volatile Fatty Acids (VFA) diluted	CI_CII_VFA
H	IV HP	0	Liquid - H2O	CIVHP_C0_H20
Nh	II	III	Liquid - NH3 Ammonia	CII_CIII_NH3
No	III	IV	Liquid - NO3 Nitrates	CIII_CIV_NO3
No	IV	IV HP	Liquid - NO3 Nitrates	CIV_CIVHP_NO3
B	EXT	0	Solid - Edible BIOMASS (External Food)	EXT_C0_BIOMASS_ED
B	IV	0	Solid - Edible BIOMASS	CIV_C0_BIOMASS_ED
B	IV HP	0	Solid - Edible BIOMASS	CIVHP_C0_BIOMASS_ED
BN	II	I	Solid - Non edible BIOMASS	CII_CI_BIOMASS_NED
BN	IV HP	I	Solid - Non edible BIOMASS	CIVHP_CI_ BIOMASS _NED
BS	IV	I	Solid - BIOMASS (Spirulina excess)	CIV_CI_ BIOMASS _SPIRU
D	IVHP	EXT	Solid - Wastes	CIVHP_EXT_BIOMASS_NED
D	III	EXT	Solid - Wastes	CIII_EXT_BIOMASS_NED
D	I	EXT	Solid - Wastes	CI_EXT_BIOMASS_NED
F	0	I	Solid FAECES + liquid	C0_CI_FAECES

Figure 7 : Description of the flows between MELISSA Loop compartments

5.2 Compartment III

5.2.1 Drawing

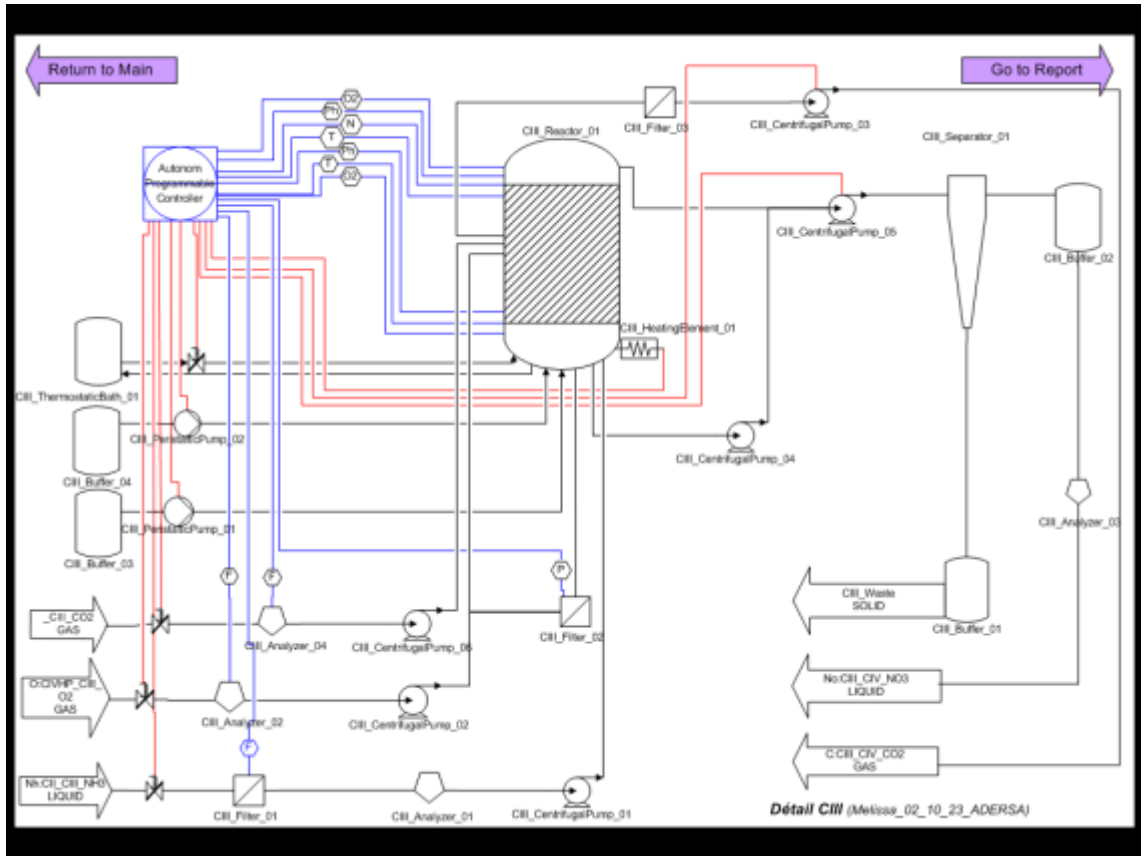


Figure 8 : Compartment III drawing

This Nitrifying Compartment drawing can be reached from the MELISSA loop drawing, by double click on the compartment component.
On this drawing, the double click on the top left hand corner arrow enables to reach the MELISSA loop, while the double click on the top right hand corner arrow, enables to display the compartment's report.
All MELISSA loop Compartment III components, are represented on this drawing.

The regulation layer is coloured. The sensor part is blue while the actuator part is red.
This regulation layer can be hidden so that the drawing is lighter.

UAB tasks: (help in APPENDIX A)

1. *Check equipment composition of nitrifying compartment.*
2. *Check links between components.*
3. *Check and complete component's personal properties.*

5.2.2 Layer manipulation

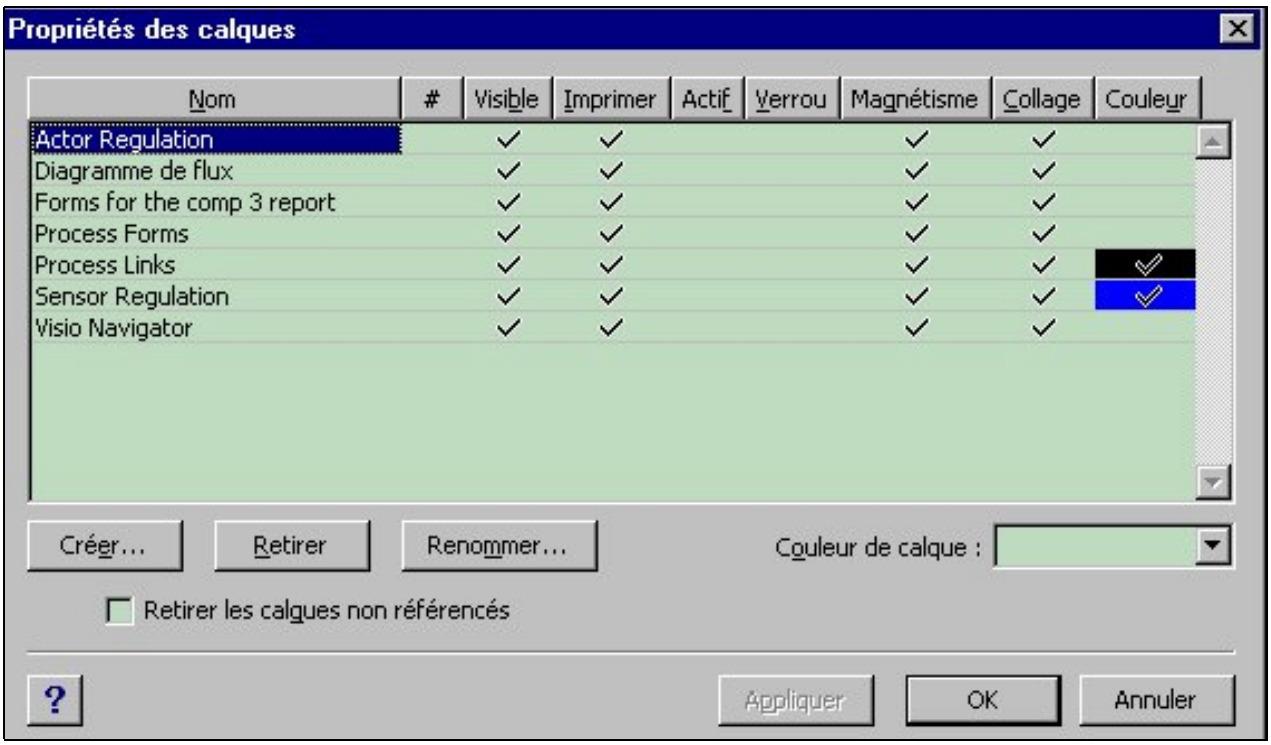


Figure 9 : Layers interface

This interface can be viewed by right click on the drawing. Then select into “Display”, the menu layers properties.
The “Visible” entitled column enables to hide or to display each layer appearing in the “Name” column, by checking and unchecking box.

5.2.3 Properties table

Each compartment component owns personal properties.
They can be viewed by mouse right button single click, and selection of “Display” and then “Personal Properties”.
If a component is used in two compartments, it appears inside the two compartments with the same parameters.
The Personal Properties list of each component, is available in APPENDIX B.

5.2.4 Compartment III report

Compartment 3 report

Creation: 23/09/2002	CONFIDENTIAL

ID Material	Description	Content
CIII_Analyzer_01		
CIII_Analyzer_02		
CIII_Analyzer_03		
CIII_Analyzer_04		
CIII_Buffer_01		
CIII_Buffer_02		
CIII_Buffer_03	Base Buffer	
CIII_Buffer_04		
CIII_CentrifugalPump_01		
CIII_CentrifugalPump_02		
CIII_CentrifugalPump_03		
CIII_CentrifugalPump_04		
CIII_CentrifugalPump_05		
CIII_CentrifugalPump_06		
CIII_Controller_01		
CIII_ElectroGate_01		
CIII_ElectroGate_02		
CIII_ElectroGate_03		
CIII_ElectroGate_04		
CIII_Filter_01		
CIII_Filter_02	/	
CIII_Filter_03		
CIII_HeatingElement_01		
CIII_PeristalticPump_01		Base Buffer flow control
CIII_PeristalticPump_02		Acid Buffer flow control
CIII_Reactor_01	Nitrifying Compartment	
CIII_Sensor_01		P
CIII_Sensor_02		O2
CIII_Sensor_03		T
CIII_Sensor_04		Ph
CIII_Sensor_05		T
CIII_Sensor_06		N
CIII_Sensor_07		Ph
CIII_Sensor_08		O2
CIII_Sensor_09		F
CIII_Sensor_10		F
CIII_Separator_01		
CIII_ThermostaticBath_01		

This report contains the list of all components used into the Compartment III drawing.

UAB tasks : validation of the report content.

(Help in APPENDIX A)

Figure 10 : Compartment III report

6. CONCLUSION

The Compartment III contains now a two levels structure :

- The process level, containing all the compartments component excepting those of the regulation loop
- The regulation level containing all components involved into the compartment's regulation, like sensors, actuators and controllers.

The database is converted into English and most of the shape's properties have been updated, for sensors and actuators among others.

Links between shapes have been checked, which enables rapid shapes characteristics update.

The database is functional.

ADERSA is waiting for the UAB's validation of :

1. The global MELISSA loop drawing,
2. The Compartment III drawing content,
3. The personal properties of Compartment III components,
4. The Compartment III report content.

7. DEVELOPMENT PROSPECTS

7.1 Compartment III drawing validation by UAB

This validation concerns the Visio file named :

MELISSA_021024_ADERSA.vsd

The Visio file which will be sent to ADERSA by UAB, will be called :

MELISSA_021024_UAB_01.vsd

7.2 Others compartments drawings update by ADERSA

This phase will contain four steps :

- Link's name updating in all other drawings,
- Creation of a report for each compartment,
- Creation of layers for each compartment (regulation, process, components for the report),
- Update of all compartments components personal properties.

7.3 Database filling by partners

Once each partner will own the database, each of them will be able to store personal properties for each component.
This step will be part of the technical database regular update.

7.4 Database installation by ADERSA

This phase will consist in the choice of a database's kind and in its creation on ADERSA's site.
This database will be a mean for ADERSA to keep a safe version for each database phase so that being able to provide the last database version to anyone of the partners, in case of drawings lost or broken.

8. APPENDIX

8.1 APPENDIX A : Visio Guide

This manual purpose is to help you along MELISSA Visio Drawing manipulation.
You may rapidly need to complete those drawings.
Actions you might need are referenced by alphabetical order, into the following table.
For more explanations or remarks, please do contact Mr Jean-Louis TESTUD.

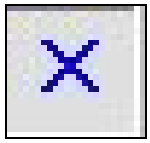
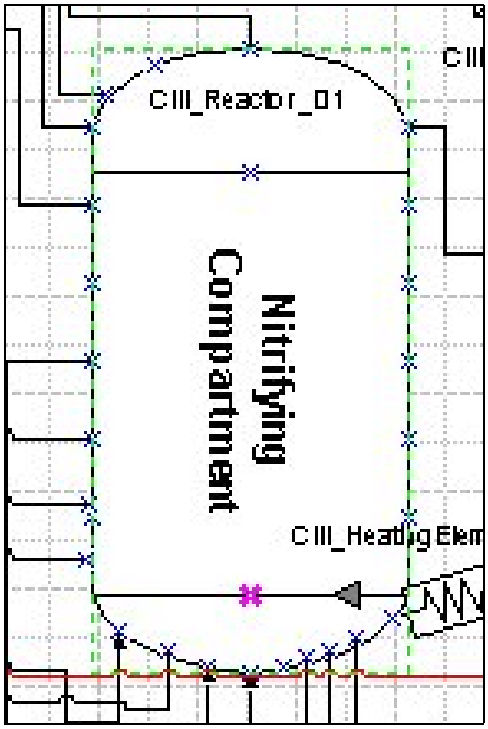
e-mail: jean-louis.testud@adersa.com

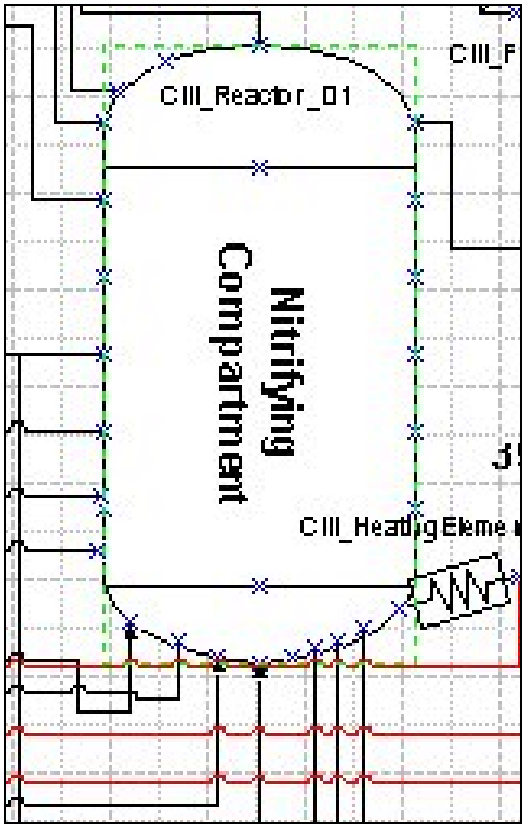
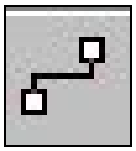
First thing to do after opening the Visio file : screen the used shapes listing. You have to click left button mouse on the menu "windows" and then to select "screen the base shapes" or "screen the document's model".

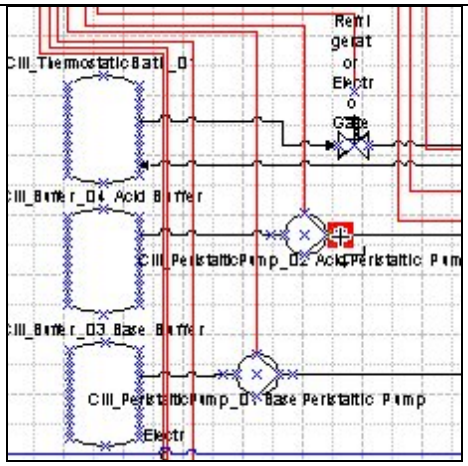
This first step is important because you need this list if you attempt to complete the drawings.

Theme	Explanation
New Shape adding	If you want to use a foreign shape into the drawings. Fist of all, you must add it to the document's shapes listing. You must open the shape's model, which contains the shape you want to add.  You've got to add this shape to one of the drawings. Automatically this new shape appears into the document shapes list. Then you must define the belonging layer. By right-mouse clicking, make appear the floating menu of the base shape into the listing. Then select "traced design" and "layer". Create new layers and associate the shape to good layers by using the Control button and the left-mouse click. Manipulation details are available below. 1. If the adding shape belongs to the process. You have to create 1 new traced design called "Process Shapes". Notice you must respect the traced design writing. Then unselect the other traced design by simultaneously pushing the control button and clicking on it with the left-hand mouse button.

	Then leave the base shape and accept the generalisation. So that, each time you will use this shape in a drawing, each time it will be associated to the traced design recorded. 2. If the shape to add belongs to the regulation part. If the shape is a sensor : You have to create 1 new traced design called “Sensor Regulation”. Notice you must respect the writing of the traced design. Then unselect the other traced design by simultaneously pushing the control button and clicking on it with the left-hand mouse button. Then leave the base shape and accept the generalisation. So that, each time you will use this shape in a drawing, each time it will be associated to the traced design recorded. If the shape is an actuator : You have to create 1 new traced design called “Actor Regulation”. Notice you must respect the writing of the traced design. Then unselect the other traced design by simultaneously pushing the control button and clicking on it with the left-hand mouse button. Then leave the base shape and accept the generalisation. So that, each time you will use this shape in a drawing, each time it will be associated to the traced design recorded. If the shape is a controller : You have to create 2 new traced designs. One called “Sensor Regulation” and another called “Actor Regulation”. Notice that you must respect the writing of both traced designs. Then unselect the third traced design by simultaneously pushing the control button and clicking on it with the left-hand mouse button. Then leave the base shape and accept the generalisation. So that, each time you will use this shape in a drawing, each time it will be associated to both traced designs recorded.
Shape adding	You want to add a base shape to a drawing. You just have to drag the shape in the document’s shapes listing and to drop it on the drawing you choose. Then you must complete drawing’s layer to whom the adding shape belongs. By right-mouse clicking, make appear the floating menu of the shape. Then select “traced design” and “layer”. Then add to the already selected layers, the layer “Shapes for the comp “?” report”. Where “?” is the number of the compartment where the shape is added. Then leave by clicking on the “OK” button.

	The traced design “Shapes for the comp “?” report” is used by Visio to generate the shape’s report of the drawing. (If you forget to include your shape into this traced design, the compartment report will not contain it after next update.) Caution : always add shapes from the document shapes list (except for foreign shape first step). Do not use the “copy” and “paste” commands because it cuts the link between the drawing shape and its base shape. Interest of conserving the link is to update all drawings shapes, simply by updating their base shape. For example you want to add a characteristic to a shape and observe this new characteristic for all those shape instances in drawings. You’ve got to add this characteristic to the base shape and accept the generalisation when asked by the software.
Connection Point adding	If you miss a connection point outside a shape, you can add it by clicking left on the blue cross  Then set the mouse arrow where you want to create the new connection point. Push in the control key and maintain it until you push in the mouse left button. A pink cross appears.  You only can manipulate cross when the blue cross symbol is selected. When the mouse arrow is on an active cross, the cross turns to pink and the mouse

	shape turns to black cross. If you want to add a connection point to an existing shape : Before “sticking” the cross, you have to select the shape by left-mouse-clicking on it (the shape outline turns to green). 
Connection points screening	If you want to screen or to hide drawings connection points, select and unselect “connection points” into the menu “screening”.
Link adding	Click-left button on the link shape.  Then bind the connection points by clicking-left on the first point, maintaining pushed in until on the second point. You know you are on a point when a red square appears.



Then you have to associate your link to a layer, like what is done for shapes.
You must select one of the three possible ways.

1. If the link lay between a sensor and a controller :

Right-mouse click on the link, select “shapeat”, then “traced design”.
On the interface of “traced design”, select the traced designs “Sensor Regulation”. Only this design must be selected. Leave.

2. If the link locates between an actuator and a controller :

Right-mouse click on the link, select “shapeat”, then “traced design”.
On the interface of “traced design”, select the traced designs “Actor Regulation”. Only this design must be selected. Leave.

3. If the link stand in the process :

Right-mouse click on the link, select “shapeat”, then “traced design”.
On the interface of “traced design”, select the traced designs “Process Links”. Only this design must be selected. Leave.

Navigation

If you want to navigate from a drawing to another.

You just have to use the arrows on the upper part of the drawing.
On the global MELISSA Loop, there is not any arrow. Just a double click on the compartment enables to reach each compartment.
On the compartment page, two arrows are screened :

- One in the top left-hand corner for going back to global MELISSA’s loop,
- Another in the top right-hand corner for going to the report page linked to the compartment.

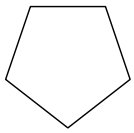
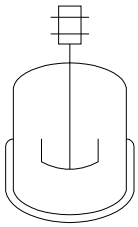
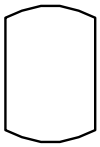
On the report page, two arrows in the top left-hand corner :

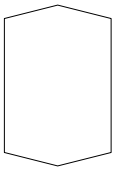
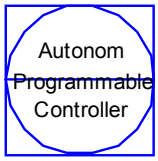
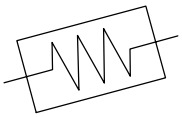
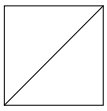
- The first one enables to go back to MELISSA global loop,

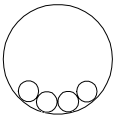
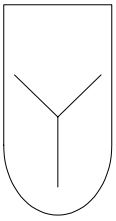
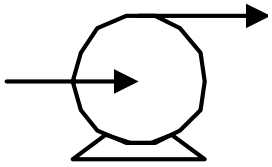
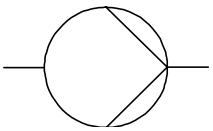
	- The second enables to go back to linked compartment.
Personal properties update	If you want to add personal properties to a shape. Select the base shape into the document's shapes list. Right-hand mouse button followed by the "display" choice of the floating menu. Then select "personalised properties". The shape personalised properties table appears on the screen. To act on the table's contain, right-mouse click and follow instructions.
Properties report update	If you want to actualise an existing properties report : Right-mouse click on the report, opening the floating menu. Then choose "actualise report". Visio create a new report, which takes into account last changes.
Personal Properties table screening	If you want to show or to hide the properties table. Mouse-right-clicking followed by the "display" choice of the floating menu and select personalised properties. NB : when the personalised properties table is displayed, it will receive personal properties of each clicked shape on drawing.

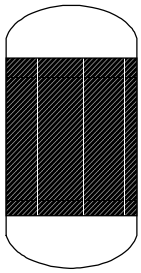
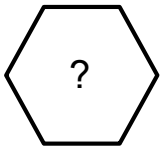
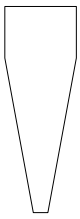
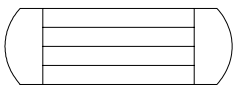
8.2 APPENDIX B : Document shapes list

Here after are the 18 component symbols available into the Visio drawings. Each symbol represents a kind of equipment.
This table is organised by Equipment alphabetical order.
For each component, the Personal Properties list is available. The list contains the main items of the equipment technical documentation.
To display this list under Visio, select the command “display base shapes” in the menu “shapes”.

Symbol	Equipment	Personal Properties list
	Analyser	ID Material Description HT Price Model Brand MTBF MTTR Hardware support Automation level Software interface Reliability
	Autoclave	ID Material Description Model HT Price Brand MTBF MTTR
	Thermostatic Bath	ID Material Volume Height Length Width Brand Model MTBF MTTR N°

	Buffer	ID Material Description Volume Height Length Width Brand Model MTBF MTTR
	Compartment	ID Material Description
	Controller	ID Material Description
	Heating Element	ID Material Description
	Exchanger	ID Material Description Model Brand HT Price MTBF MTTR
	Filter	ID Material Description Model Brand HT Price MTBF MTTR

	Electro Gate	Range ID Material Accuracy Calibration Response Time On-line utilisation Electrical requirements Necessity of consumables Alarm management Commercial or adaptation Communication Protocol General conditions Sterilizable
	Grinder	ID Material Description Model Brand HT Price MTBF MTTR
	Mixer	ID Material Description Model Brand HT Price MTBF MTTR
	Centrifugal Pump	Range ID Material Accuracy Calibration Response Time On-line utilisation Electrical requirements Necessity of consumables Alarm management Commercial or adaptation Communication Protocol General conditions Sterilizable
	Peristaltic Pump	Pump Type ID Material Description

	Reactor	ID Material Description HT Price MTBF MTTR Model Brand
	Generic Sensor	ID Material Content Description Purpose Range Accuracy Calibration On-line utilisation Electrical requirements Necessity of consumables Alarm management Commercial or adaptation Communication Protocol General conditions Sterilizable
	Solid Separator	ID Material Description Model Brand HT Price MTBF MTTR
	Sterilizer	ID Material Description Model Brand HT Price MTBF MTTR

8.3 APPENDIX C : Nomenclature table

Term	Definition
B	Edible Biomass
Bexternal	External Edible Biomass
BN	Non Edible Biomass
BS	Biomass Spirulina Excess
C	CO_2
Cexternal	External CO_2
Dwaste	Waste
F	Faeces
H	H_2O
HPC	Higher Plant Compartment
Nh	NH_4^+
No	NO_3^-
O	O_2
U	Urine
V	Volatile Fatty Acids

8.4 APPENDIX D : Glossary

Term	Definition
Document's shapes list	List of all component symbols. This list is displayed near Visio drawings. It is useful for modifying Visio drawings.
Shape	Component's symbol, which can be use into the Visio drawings. All those components are available into a list called document's shapes list.