MELISSA

Memorandum of Understanding
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TECHNICAL NOTE : 62.8

Dependability analysis of MELISSA
Model building methodology – Physical description

Version : 1
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SUMMARY

1. PRELIMINARIES

1.1 Document historical record

Date	Version	Issue	Author	Up to date object
2002/02/20	1	0	JL Testud	Creation
2002/06/10	1	0	N. Braunwald	Verification
24/03/03	1	0	A. Bahet	Verification

1.2 List of the modified pages

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

Without object for this edition

2. OTHER INFORMATIONS

2.1 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 (01.60.13.53.48)
  - Ninon BRAUNWALD (01.60.13.53.52)

2.2 Data source

TN 62-8_0 VA.doc

2.3 Reference documents

- ESA Documents:
  - TN 18-1
  - TN 37-6
  - TN 47-5
  - TN 62-7_0

- UAB Documents
  - Anne VERNEREY's thesis
  - Julio PEREZ's thesis
  - …

3. REQUIREMENTS

3.1 Requirements definition

The aim of this memo is to provide the relevant information in order to offer technical solutions for the Melissa driving system described herewith.

3.2 Description reminders of the MELISSA loop

3.2.1 Principle

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 eatable 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 organization.

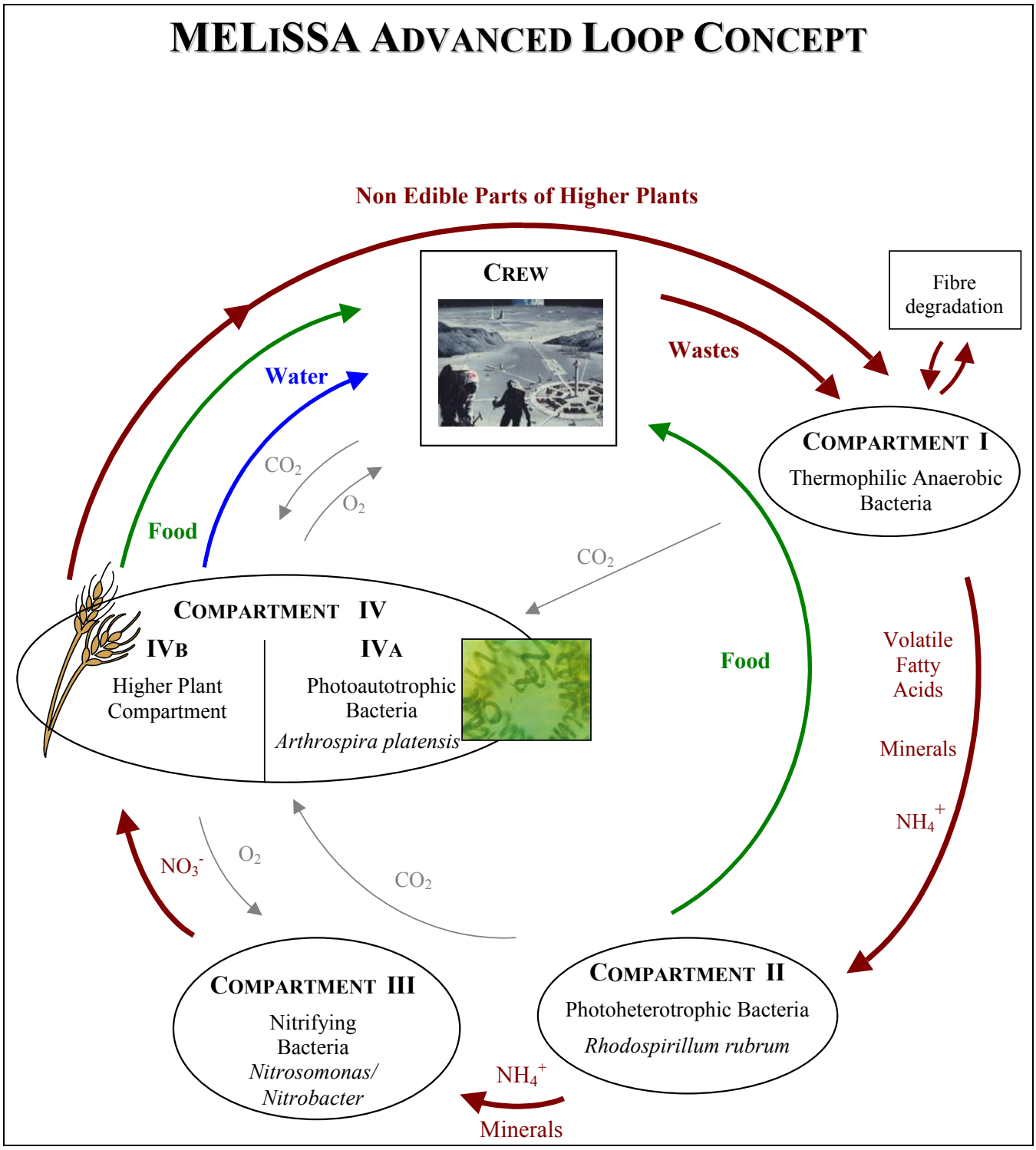


Diagram N ° 1 : Principle schema of the Melissa loop (from *Lattenmayer)*

4. INTRODUCTION:

Safety analysis is a large and crucial problem for MELISSA

- specially for a mission which is long duration (> 30 months), long distance (ISS, Mars, …), under hard constraints (weight, spare part limited)
- specially for a process which is the result of a multi partner work (more than 7 teams), and is composed of several interconnected processes designed by different teams.

It is important to act as soon as possible and with the efficient tools and partners to solve correctly these problems.

We have used an analytical method for complex system to model MELISSA process and to prepare a dependability analysis.

This approach is based on M3C concept for modelling according three distinct viewpoints called layers (physical plane, functional plane and control plane). This method helps to verify safety requirements at complex system designing time.

This model building is expressed by a construction methodology of models, supported by computer aids for checking and validation of generated models. It is based on the description of the model in text file forms, which makes possible a certain rigour for the model description, and easier output process and will apply on MELISSA loop definition.

In this note, we remind the TN 62.7 results. So in the appendix, we showed all html results according to Melissa loop (see VISIO diagrams of the TN 62.7).

5. RESULTS :

5.1 Compilation of model :

For the model compilation, we use the Makefile given with the M3C code. So, that is advisable to enter in CYGWIN window the "make" command.

5.2 Directories of results files :

The files which result from the description file compilation will be created in the Bd and Htm directories.

5.3 Visualization of results

Once, the file is compiled without errors, we can visualize the obtained results:

5.3.1 Textual Visualization:

Text files:

The “output.txt” files allows the visualization of result in textual shape.

HTML files:

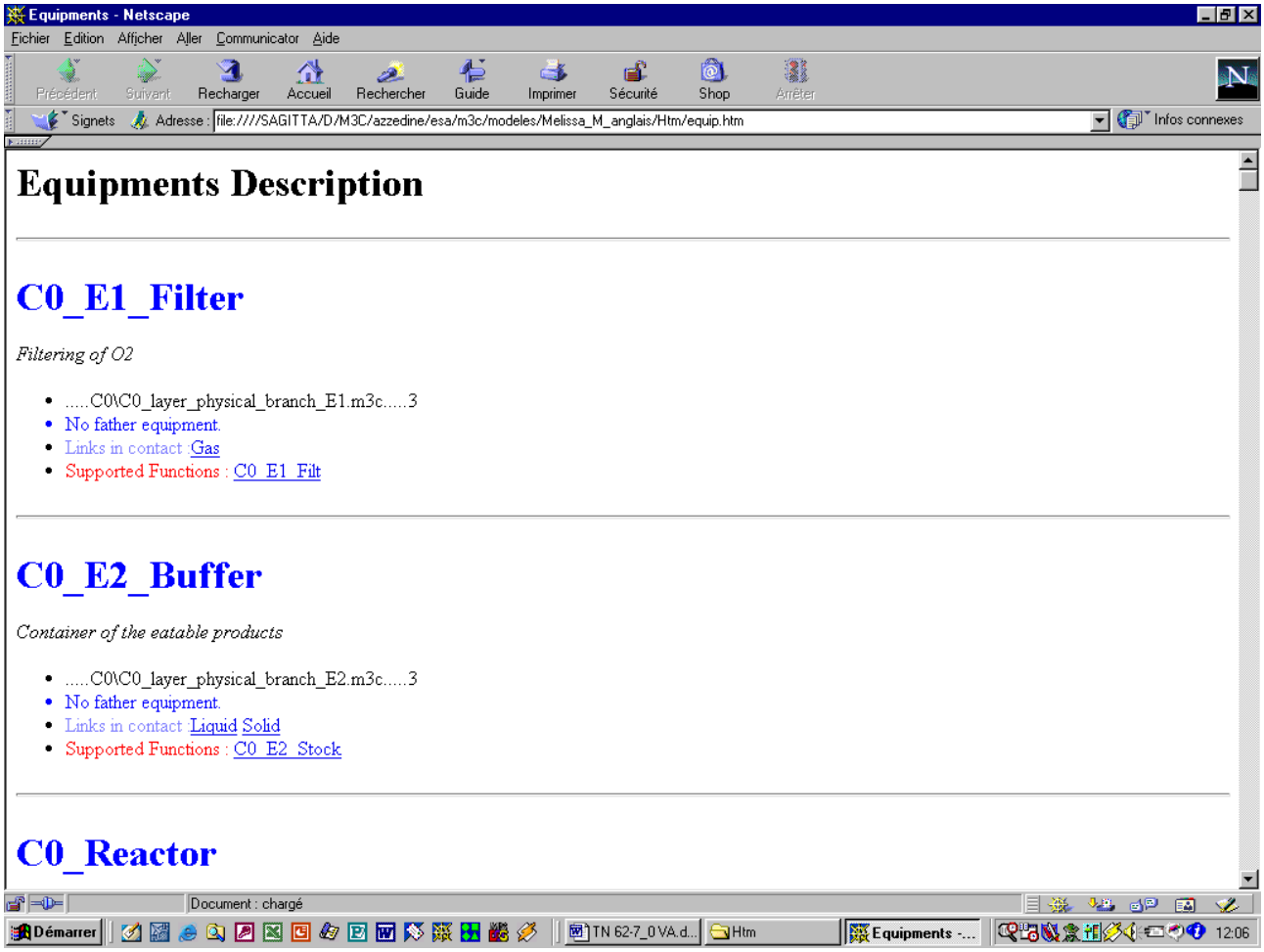
The visualization of the “htm file” is carried out in the Htm directory. So, that is advisable to click on one of htm files or, to start Netscape Navigator and to open the required file.
The htm files possess the particularity to have at one's disposal reference links between the different htm files. That implicates the possibility to surf from one file to another by clicking on the elements of the opened file.

⇒ The arboequ.htm, arbofct.htm, arboflx.htm, arbolie.htm files, display the list of the respective tree diagrams of equipment, functions, flows, links.

⇒ The equip.htm, etat.htm, flux.htm, fonction.htm, lien.htm files, represent textually the respective entities: equipment, state, flow, function, link, and the entities, which they directly depend.

Window 2. arboequ.htm

Clicking on one of the Equipment of arboequ.htm file, opens the equip.htm file which contains all the Equipment and the entities that are directly linked (see window 3).



Window 3. equip.htm

⇒ The arbre.htm file, displays causality tree of physical and functional plans
⇒ The arbref.htm file, displays causality tree of functional plan
⇒ The doc.htm, displays causality tree of physical and functional plans without details
⇒ The ectrl.htm file, displays the entities list in shape of hierarchic trees, lists of the objects and causal trees.

6. ANNEXES :

6.1 Html results:

Html Files		Function of file
Equipments	arboequ.htm	Equipment tree structure
	equip.htm	Equipments description
Functions	arbofct.htm	Function tree structure
	fonction.htm	Functions description
Flows	arboflx.htm	Flow tree structure
	flux.htm	Flows description
Links	arbolie.htm	Link tree structure
	lien.htm	Links description
Trees	arbre.htm	Causality trees (functionnal and physical model)
	arbref.htm	Causality trees (functionnal model)

6.2 Equipments

6.2.1 Equipment tree structure

Equipment tree structure

C0_E1_Filter .....*Filtering of O2*
C0_E2_Buffer .....*Container of the eatable products*
C0_Reactor .....*Supplying in eatable products and in O2 et rejection of CO2*
C0_S1_Filter .....*Filtering of CO2*
C0_S1_Pump .....*Pump to supply CO2 of Compart_C0 and alimentat of Compart_CIVHP*
C0_S2.1_Buffer .....*Container of urines*
C0_S2.1_Filter .....*Filtering of urines at the entrance of the Buffer*
C0_S2.1_Pump .....*Pump of supplying urines and supplying of Compartment_CI*
C0_S2.2_Mixer .....*Mix water with waste coming from Separator_4*
C0_S2_Buffer .....*Container of waste*
C0_S2_Separator .....*Separation Urines / Faeces*
CIII_E1_Analyzer .....*Analysis of Ammoniaque*
CIII_E1_Filter .....*Ammoniaque Filtering at the entrance of Reactor_CIII*
CIII_E1_Pump ..... *Nutrition in Ammoniaque of Reactor_CIII*
CIII_E2_Analyzer .....*Analysis of O2*
CIII_E2_Filter .....*Filtering of O2*
CIII_E2_Pump .....*Nutrition in O2 of Reactor_CIII*
CIII_Reactor .....*Nitrification : transformation of Ammoniaque into Nitrate*
CIII_S1_Filter .....*Filtering of CO2*
CIII_S1_Pump .....*Pump of CO2 of Reactor_CIII*
CIII_S2.1_Analyzer .....*Analysis*
CIII_S2.1_Buffer .....*Storage of liquid at the exit of Separator_3.4*
CIII_S2.2_Buffer .....*Storage of Solid at the exit of Separator*
CIII_S2_Pump .....*Pump Reactor_CIII*
CIII_S2_Separator .....*Separation Liquid Solid at the exit of Reactor_CIII*
CIII_S2andE1_Pump .....*Recycling Reactor_CIII*
CII_E1_Analyzer .....*Analysis of VFA*
CII_E1_Filter .....*Filtering of VFA in entrance of Reactor_CII*
CII_E1_Pump .....*Nutrition Pump of Reactor_CII*
CII_E2_Filter .....*Filtering of CO2 in entrance of Reactor_CII*
CII_E2_Pump .....*Nutrition pump of Reactor_CII before the filter (CO2)*
CII_Reactor .....*Rhodobacter production of ammoniaque*
CII_S1_Analyzer .....*Analysis of CO2*
CII_S1_Filter .....*Filtering of CO2 in exit of Reactor_CII*
CII_S1_Pump .....*Pump gas from Reactor_CII*
CII_S2.1_Analyzer .....*Analysis of liquids in exit of Separator__2.4*
CII_S2.1_Buffer .....*Container in exit of Analyzer_2.4.2*
CII_S2.1_Filter .....*Filtering of ammoniaque in exit of Separator_2.4*
CII_S2.2_Buffer .....*Container in exit of Separator_2.4*
CII_S2_Analyzer .....*Analysis of exit flows from du Reactor_CII*
CII_S2_Buffer .....*Container in exit of Reactor_CII*
CII_S2_Separator .....*Separation liquid-solid in exit of Reactor_CII*
CIVHP_E1_Analyzer .....*Analysis CO2*
CIVHP_E1_Filter .....*Filtering of CO2 at the entrance of Reactor_CIV_HP*
CIVHP_E1_Mixer .....*Mixing of CO2*

CIVHP_E1_Pump ..... *Nutrition in CO2 of reactor_CIV_HP*
CIVHP_E2_Mixer .....*Mixing of Water/Urines/Biomass and nutrition of Reactor_CIV_HP*
CIVHP_E2_Pump .....*Nutrition in CO2/Biomass/Water at the entrance of Reactor_CIV_HP*
CIVHP_Reactor .....*Production of O2*
CIVHP_S1_Buffer .....*Water container*
CIVHP_S1_Exchanger .....*Separation of O2 and H2O(g)*
CIVHP_S1_Filter .....*Filtering of gas at the exit of reactor_CIV_HP*
CIVHP_S1_Pompe .....*Pump of O2 at the exit of reactor_CIV_HP*
CIVHP_S2.1_Crusher .....*Crushing of part of eatable biomass*
CIVHP_S2.2_Treatment .....*Treatment of a part of eatable biomass for nutrition end*
CIVHP_S2_Buffer .....*Storage of Biomass*
CIV_E1_Buffer .....*Storage Nitrates at the entrance of Reactor_CVI*
CIV_E1_Filter .....*Filtering of Nitrates at the entrance of Reactor_CIV*
CIV_E1_Pump ..... *Nutrition in Nitrates of Reactor_CIV*
CIV_E2_Analyzer .....*Analysis CO2 and O2*
CIV_E2_Buffer .....*Storage CO2 at the entrance of Reactor_CIV*
CIV_E2_Filter .....*Filtering of CO2 and O2 at the entrance of Reactor_CIV*
CIV_E2_Pump .....*Nutrition in CO2 and O2 of Reactor_CIV*
CIV_Reactor .....*Production of biomass : transformation of Nitrates into Spiruline*
CIV_S1_Buffer .....*Storage O2 at the exit of Reactor_CIV*
CIV_S1_Filter .....*Filtering of O2 at the exit of Reactor_CVI*
CIV_S1_Pump .....*Extraction of O2 at the exit of Reactor_CIII*
CIV_S1andE2_Pump .....*Recycling Gas O2 to Reactor_CIV through E2*
CIV_S2.1_Buffer .....*Biomass_liquid Storage at the exit of Separator*
CIV_S2.1_Filter .....*Liquid biomass Filtering at the exit of Reactor_CVI*
CIV_S2.2_Buffer .....*Biomass_solid Storage at the exit of Separator*
CIV_S2_Buffer .....*Biomass Storage at the exit of Reactor_CIV*
CIV_S2_Separator .....*Liquid Solid Separation at the exit of Reactor_CIV*
CI_E1_Exchanger .....*Act on the mixing temperature*
CI_E1_Mixer .....*Ensure the composition and the proportions of the mixing*
CI_E1_Pump .....*Pump of the mixer*
CI_Reactor .....*Bio damage of waste of the crew and surplus*
CI_S1_Filter .....*Filter*
CI_S1_Pump .....*Pump of reactor_CI*
CI_S2.1_Buffer .....*Container*
CI_S2.1_Exchanger .....*Exchanger*
CI_S2.1_Filter .....*Filter*
CI_S2.1_Pump .....*Pump*
CI_S2.1_Sterilizer_UV .....*sterilizer*
CI_S2.2_Buffer .....*Storage of solids of the separation*
CI_S2_Pump .....*Pump*
CI_S2_Solid_Separator .....*Separate solids from liquids*
EXT_EQUIPMENT_Nature .....*Equipment fictitious*

6.2.2 Equipments description

Equipments Description

C0_E1_Filter

Filtering of O2

- .....C0\C0_layer_physical_branch_E1.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : C0_E1_Filt

C0_E2_Buffer

Container of the eatable products

- .....C0\C0_layer_physical_branch_E2.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : C0_E2_Stock

C0_Reactor

Supplying in eatable products and in O2 et rejection of CO2

- .....C0\C0_layer_physical2.m3c.....7
- No father equipment.
- Links in contact :Liquid Gas Solid
- Supported Functions : C0_OfferVitalSpace

C0_S1_Filter

Filtering of CO2

- .....C0\C0_layer_physical_branch_S1.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : C0_S1_Filt

C0_S1_Pump

Pump to supply CO2 of Compart_C0 and alimentat of Compart_CIVHP

- .....C0\C0_layer_physical_branch_S1.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : C0_S1_Pum

C0_S2.1_Buffer

Container of urines

- .....C0\C0_layer_physical_branch_S2.m3c.....46
- No father equipment.
- Links in contact :Liquid

- Supported Functions : C0_S2.1_CI_Stock

C0_S2.1_Filter

Filtering of urines at the entrance of the Buffer

- .....C0\C0_layer_physical_branch_S2.m3c.....31
- No father equipment.
- Links in contact :Liquid
- Supported Functions : C0_S2.1_CI_Filt

C0_S2.1_Pump

Pump of supplying urines and supplying of Compartment_CI

- .....C0\C0_layer_physical_branch_S2.m3c.....60
- No father equipment.
- Links in contact :Liquid
- Supported Functions : C0_S2.1_CI_Evacuate

C0_S2.2_Mixer

Mix water with waste coming from Separator_4

- .....C0\C0_layer_physical_branch_S2.m3c.....74
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : C0_S2.2_Mix

C0_S2_Buffer

Container of waste

- .....C0\C0_layer_physical_branch_S2.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : C0_S2_Stock

C0_S2_Separator

Separation Urines / Faeces

- .....C0\C0_layer_physical_branch_S2.m3c.....17
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : C0_S2_Separate

CIII_E1_Analyzer

Analysis of Ammoniaque

- .....CIII\CIII_layer_physical_branch_E1.m3c.....16
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIII_E1_Analyze

CIII_E1_Filter

Ammoniaque Filtering at the entrance of Reactor_CIII

- .....CIII\CIII_layer_physical_branch_E1.m3c.....2

- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIII_E1_Filt

CIII_E1_Pump

Nutrition in Ammoniaque of Reactor_CIII

- .....CIII\CIII_layer_physical_branch_E1.m3c.....30
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIII_E1_Pum

CIII_E2_Analyzer

Analysis of O2

- .....CIII\CIII_layer_physical_branch_E2.m3c.....2
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIII_E2_Analyze

CIII_E2_Filter

Filtering of O2

- .....CIII\CIII_layer_physical_branch_E2.m3c.....30
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIII_E2_Filt

CIII_E2_Pump

Nutrition in O2 of Reactor_CIII

- .....CIII\CIII_layer_physical_branch_E2.m3c.....16
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIII_E2_Pum

CIII_Reactor

Nitrification : transformation of Ammoniaque into Nitrate

- .....CIII\CIII_layer_physical2.m3c.....8
- No father equipment.
- Links in contact :Liquid Gas Solid
- Supported Functions : CIII_Reaction

CIII_S1_Filter

Filtering of CO2

- .....CIII\CIII_layer_physical_branch_S1.m3c.....2
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIII_S1_Filt

CIII_S1_Pump

Pump of CO2 of Reactor_CIII

- .....CIII\CIII_layer_physical_branch_S1.m3c.....16
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIII_S1_Pum

CIII_S2.1_Analyzer

Analysis

- .....CIII\CIII_layer_physical_branch_S2.m3c.....45
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIII_S2.1_Analyze

CIII_S2.1_Buffer

Storage of liquid at the exit of Separator_3.4

- .....CIII\CIII_layer_physical_branch_S2.m3c.....31
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIII_S2.1__Stock

CIII_S2.2_Buffer

Storage of Solid at the exit of Separator

- .....CIII\CIII_layer_physical_branch_S2.m3c.....59
- No father equipment.
- Links in contact :Solid
- Supported Functions : CIII_S2.2_Stock

CIII_S2_Pump

Pump Reactor_CIII

- .....CIII\CIII_layer_physical_branch_S2.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CIII_S2_Pum

CIII_S2_Separator

Separation Liquid Solid at the exit of Reactor_CIII

- .....CIII\CIII_layer_physical_branch_S2.m3c.....17
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CIII_S2_Separate

CIII_S2andE1_Pump

Recycling Reactor_CIII

- .....CIII\CIII_layer_physical_branch_S2.m3c.....73
- No father equipment.
- Links in contact :Liquid Solid

- Supported Functions : CIII_S2andE1_Pum

CII_E1_Analyzer

Analysis of VFA

- .....CII\CII_layer_physical_branch_E1.m3c.....3
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CII_E1_Analyze

CII_E1_Filter

Filtering of VFA in entrance of Reactor_CII

- .....CII\CII_layer_physical_branch_E1.m3c.....17
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CII_E1_Filt

CII_E1_Pump

Nutrition Pump of Reactor_CII

- .....CII\CII_layer_physical_branch_E1.m3c.....31
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CII_E1_Feed

CII_E2_Filter

Filtering of CO2 in entrance of Reactor_CII

- .....CII\CII_layer_physical_branch_E2.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : CII_E2_Filt

CII_E2_Pump

Nutrition pump of Reactor_CII before the filter (CO2)

- .....CII\CII_layer_physical_branch_E2.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : CII_E2_Feed

CII_Reactor

Rhodobacter production of ammoniaque

- .....CII\CII_layer_physical2.m3c.....7
- No father equipment.
- Links in contact :Gas Liquid Solid
- Supported Functions : CII_Rhodobacter_reactor_II

CII_S1_Analyzer

Analysis of CO2

- .....CII\CII_layer_physical_branch_S1.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : CII_S1_Analyze

CII_S1_Filter

Filtering of CO2 in exit of Reactor_CII

- .....CII\CII_layer_physical_branch_S1.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : CII_S1_Filt CIVHP_S1_Filt

CII_S1_Pump

Pump gas from Reactor_CII

- .....CII\CII_layer_physical_branch_S1.m3c.....31
- No father equipment.
- Links in contact :Gas
- Supported Functions : CII_S1_Pum CIVHP_S1_Pum

CII_S2.1_Analyzer

Analysis of liquids in exit of Separator__2.4

- .....CII\CII_layer_physical_branch_S2.m3c.....59
- No father equipment.

- Links in contact :Liquid
- Supported Functions : CII_S2.1_Analyze

CII_S2.1_Buffer

Container in exit of Analyzer_2.4.2

- .....CII\CII_layer_physical_branch_S2.m3c.....73
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CII_S2.1_Stock

CII_S2.1_Filter

Filtering of ammoniaque in exit of Separator_2.4

- .....CII\CII_layer_physical_branch_S2.m3c.....45
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CII_S2.1_Filt

CII_S2.2_Buffer

Container in exit of Separator_2.4

- .....CII\CII_layer_physical_branch_S2.m3c.....87
- No father equipment.
- Links in contact :Solid
- Supported Functions : CII_S2.2_Stock

CII_S2_Analyzer

Analysis of exit flows from du Reactor_CII

- .....CII\CII_layer_physical_branch_S2.m3c.....17
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CII_S2_Analyze

CII_S2_Buffer

Container in exit of Reactor_CII

- .....CII\CII_layer_physical_branch_S2.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CII_S2_Stock

CII_S2_Separator

Separation liquid-solid in exit of Reactor_CII

- .....CII\CII_layer_physical_branch_S2.m3c.....31
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CII_S2_Separate

CIVHP_E1_Analyzer

Analysis CO2

- .....CIVHP\CIVHP_layer_physical_branch_E1.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIVHP_E1_Analyze

CIVHP_E1_Filter

Filtering of CO2 at the entrance of Reactor_CIV_HP

- .....CIVHP\CIVHP_layer_physical_branch_E1.m3c.....45
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIVHP_E1_Filt

CIVHP_E1_Mixer

Mixing of CO2

- .....CIVHP\CIVHP_layer_physical_branch_E1.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIVHP_E1_Mix

CIVHP_E1_Pump

Nutrition in CO2 of reactor_CIV_HP

- .....CIVHP\CIVHP_layer_physical_branch_E1.m3c.....31
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIVHP_E1_Feed

CIVHP_E2_Mixer

Mixing of Water/Urines/Biomass and nutrition of Reactor_CIV_HP

- .....CIVHP\CIVHP_layer_physical_branch_E2.m3c.....3
- No father equipment.
- Links in contact :Gas Liquid Solid
- Supported Functions : CIVHP_E2_Mix

CIVHP_E2_Pump

Nutrition in CO2/Biomass/Water at the entrance of Reactor_CIV_HP

- .....CIVHP\CIVHP_layer_physical_branch_E2.m3c.....17
- No father equipment.
- Links in contact :Gas Liquid Solid
- Supported Functions : CIVHP_E2_Feed

CIVHP_Reactor

Production of O2

- .....CIVHP\CIVHP_layer_physical2.m3c.....7
- No father equipment.
- Links in contact :Liquid Gas Solid
- Supported Functions : CIVHP_Product_plants_superiors

CIVHP_S1_Buffer

Water container

- .....CIVHP\CIVHP_layer_physical_branch_S1.m3c.....45
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIVHP_S1_Stock

CIVHP_S1_Exchanger

Separation of O2 and H2O(g)

- .....CIVHP\CIVHP_layer_physical_branch_S1.m3c.....31
- No father equipment.
- Links in contact :Gas Liquid
- Supported Functions : CIVHP_S1_Modify_Temperature

CIVHP_S1_Filter

Filtering of gas at the exit of reactor_CIV_HP

- .....CIVHP\CIVHP_layer_physical_branch_S1.m3c.....3
- No father equipment.
- Links in contact :Gas

CIVHP_S1_Pompe

Pump of O2 at the exit of reactor_CIV_HP

- .....CIVHP\CIVHP_layer_physical_branch_S1.m3c.....17
- No father equipment.
- Links in contact :Gas

CIVHP_S2.1_Crusher

Crushing of part of eatable biomass

- .....CIVHP\CIVHP_layer_physical_branch_S2.m3c.....17
- No father equipment.
- Links in contact :Solid
- Supported Functions : CIVHP_S2.1_Crush

CIVHP_S2.2_Treatment

Treatment of a part of eatable biomass for nutrition end

- .....CIVHP\CIVHP_layer_physical_branch_S2.m3c.....31
- No father equipment.
- Links in contact :Solid
- Supported Functions : CIVHP_S2.2_Treat

CIVHP_S2_Buffer

Storage of Biomass

- .....CIVHP\CIVHP_layer_physical_branch_S2.m3c.....3
- No father equipment.
- Links in contact :Solid Liquid
- Supported Functions : CIVHP_S2_Stock

CIV_E1_Buffer

Storage Nitrates at the entrance of Reactor_CVI

- .....CIV\CIV_layer_physical_branch_E1.m3c.....17
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIV_E1_Stock

CIV_E1_Filter

Filtering of Nitrates at the entrance of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_E1.m3c.....3
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIV_E1_Filt

CIV_E1_Pump

Nutrition in Nitrates of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_E1.m3c.....31
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIV_E1_Feed

CIV_E2_Analyzer

Analysis CO2 and O2

- .....CIV\CIV_layer_physical_branch_E2.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_E2__Analyze

CIV_E2_Buffer

Storage CO2 at the entrance of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_E2.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_E2_Stock

CIV_E2_Filter

Filtering of CO2 and O2 at the entrance of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_E2.m3c.....45
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_E2_Filt

CIV_E2_Pump

Nutrition in CO2 and O2 of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_E2.m3c.....31
- No father equipment.
- Links in contact :Gas

- Supported Functions : CIV_E2_Feed

CIV_Reactor

Production of biomass : transformation of Nitrates into Spiruline

- .....CIV\CIV_layer_physical2.m3c.....7
- No father equipment.
- Links in contact :Liquid Gas Solid
- Supported Functions : CIV_Product_biomass

CIV_S1_Buffer

Storage O2 at the exit of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_S1.m3c.....31
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_S1_Stock

CIV_S1_Filter

Filtering of O2 at the exit of Reactor_CVI

- .....CIV\CIV_layer_physical_branch_S1.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_S1_Filt

CIV_S1_Pump

Extraction of O2 at the exit of Reactor_CIII

- .....CIV\CIV_layer_physical_branch_S1.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_S1_Pum

CIV_S1andE2_Pump

Recycling Gas O2 to Reactor_CIV through E2

- .....CIV\CIV_layer_physical_branch_E2.m3c.....59
- No father equipment.
- Links in contact :Gas
- Supported Functions : CIV_S1andE2_Feed_Analyzer

CIV_S2.1_Buffer

Biomass_liquid Storage at the exit of Separator

- .....CIV\CIV_layer_physical_branch_S2.m3c.....45
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIV_S2.1_Stock

CIV_S2.1_Filter

Liquid biomass Filtering at the exit of Reactor_CVI

- .....CIV\CIV_layer_physical_branch_S2.m3c.....31

- No father equipment.
- Links in contact :Liquid
- Supported Functions : CIV_S2.1_Filt

CIV_S2.2_Buffer

Biomass_solid Storage at the exit of Separator

- .....CIV\CIV_layer_physical_branch_S2.m3c.....59
- No father equipment.
- Links in contact :Solid
- Supported Functions : CIV_S2.2_Stock

CIV_S2_Buffer

Biomass Storage at the exit of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_S2.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CIV_S2_Stock

CIV_S2_Separator

Liquid Solid Separation at the exit of Reactor_CIV

- .....CIV\CIV_layer_physical_branch_S2.m3c.....17
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CIV_S2_Separate

CI_E1_Exchanger

Act on the mixing temperature

- .....CI\CI_layer_physical_branch_E1.m3c.....31
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CI_E1_Modify_temperature

CI_E1_Mixer

Ensure the composition and the proportions of the mixing

- .....CI\CI_layer_physical_branch_E1.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CI_E1_Mix

CI_E1_Pump

Pump of the mixer

- .....CI\CI_layer_physical_branch_E1.m3c.....17
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CI_E1_Pum

CI_Reactor

Bio damage of waste of the crew and surplus

- .....CI\CI_layer_physical2.m3c.....7
- No father equipment.
- Links in contact :Liquid Gas Solid
- Supported Functions : CI_Product_VFA

CI_S1_Filter

Filter

- .....CI\CI_layer_physical_branch_S1.m3c.....17
- No father equipment.
- Links in contact :Gas
- Supported Functions : CI_S1_Filt

CI_S1_Pump

Pump of reactor_CI

- .....CI\CI_layer_physical_branch_S1.m3c.....3
- No father equipment.
- Links in contact :Gas
- Supported Functions : CI_S1_Pum

CI_S2.1_Buffer

Container

- .....CI\CI_layer_physical_branch_S2.m3c.....87
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CI_S2.1_Stock

CI_S2.1_Exchanger

Exchanger

- .....CI\CI_layer_physical_branch_S2.m3c.....31
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CI_S2.1_Modify_Temperature

CI_S2.1_Filter

Filter

- .....CI\CI_layer_physical_branch_S2.m3c.....73
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CI_S2.1_Filt

CI_S2.1_Pump

Pump

- .....CI\CI_layer_physical_branch_S2.m3c.....45
- No father equipment.
- Links in contact :Liquid

- Supported Functions : CI_S2.1_pum

CI_S2.1_Sterilizer_UV

sterilizer

- .....CI\CI_layer_physical_branch_S2.m3c.....59
- No father equipment.
- Links in contact :Liquid
- Supported Functions : CI_S2.1_sterilize

CI_S2.2_Buffer

Storage of solids of the separation

- .....CI\CI_layer_physical_branch_S2.m3c.....101
- No father equipment.
- Links in contact :Solid
- Supported Functions : CI_S2.2_stock

CI_S2_Pump

Pump

- .....CI\CI_layer_physical_branch_S2.m3c.....3
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CI_S2_pum

CI_S2_Solid_Separator

Separate solids from liquids

- .....CI\CI_layer_physical_branch_S2.m3c.....17
- No father equipment.
- Links in contact :Liquid Solid
- Supported Functions : CI_S2_separate

EXT_EQUIPMENT_Nature

Equipment fictitious

- .....EXT\EXT_compartment_fictitious.m3c.....1
- No father equipment.
- Links in contact :Gas Solid Liquid
- Supported Functions : EXT_FUNCTION_Nature

6.3 Functions

6.3.1 Function tree structure

Function Tree Structure

C0_E1_Filt .....*Filtering of O2*
C0_E2_Stock .....*Supply in eatable product of C0 reactor*
C0_OfferVitalSpace .....*Offer a vital space to the crew (air, water, food)*
C0_S1_Filt .....*Filtering of CO2 outside the C0 reactor*
C0_S1_Pum .....*Pump of CO2 outside the C0 reactor*
C0_S2.1_CI_Evacuate .....*Evacuations of URINES to compartment CI*
C0_S2.1_CI_Filt .....*Filtering of the supply liquid of separator*
C0_S2.1_CI_Stock .....*Container of URINES*
C0_S2.2_Mix .....*Mix the solid products with water (de CIVHP)*
C0_S2_Separate .....*Analysis of supplying mixture of the C0 reactor*
C0_S2_Stock .....*Container of the mixtures outside the C0 Reactor*
CIII_E1_Analyze .....*Analysis of liquids*
CIII_E1_Filt .....*Filtering of NH3*
CIII_E1_Pum .....*Nutrition of the Reactor CIII of NH3 filtered and analyzed*
CIII_E2_Analyze .....*Analysis of O2*
CIII_E2_Filt .....*Filtering de O2 and CO2*
CIII_E2_Pum .....*Nutrition of Reactor CIII in O2 before filtering*
CIII_Reaction .....*Reaction of CIII*
CIII_S1_Filt .....*Filtering of CO2 at the exit of Reactor CIII*
CIII_S1_Pum .....*Pump of CO2 at the exit of Reactor CIII*
CIII_S2.1_Analyze .....*Analysis of liquids*
CIII_S2.1__Stock .....*Stock of liquids*
CIII_S2.2_Stock .....*Stock of liquids*
CIII_S2_Pum .....*Pump of the liquids at the exit of Reactor CIII*
CIII_S2_Separate .....*Separation of liquids and solids*
CIII_S2andE1_Pum .....*Recycling of the liquid coming from Reactor CIII*
CII_E1_Analyze .....*Analysis of pump gas from reactor II*
CII_E1_Feed .....*Liquid nutrition of reactor II*
CII_E1_Filt .....*Filtering of liquid nutrition of reactor II*
CII_E2_Feed .....*Gas nutrition of the reactor II*
CII_E2_Filt .....*Filtering of gas nutrition of the reactor II*
CII_Rhodobacter_reactor_II .....*Transform FAT into ammonium*
CII_S1_Analyze .....*Analysis gas pumping from reactor II*
CII_S1_Filt .....*Filtering of gas pumping c II*
CII_S1_Pum .....*Gas Pump from reactor II*
CII_S2.1_Analyze .....*Analysis of liquid pumpig from separator*
CII_S2.1_Filt .....*Filtering of liquid pumping from separator*
CII_S2.1_Stock .....*Storage of liquid pumpig from separator*
CII_S2.2_Stock .....*Storage of solid pumpig from separator*
CII_S2_Analyze .....*Analysis liquid pumping from reactor II*
CII_S2_Separate .....*Separation liquid-solid*
CII_S2_Stock .....*Storage liquid pumping from reactor II*
CIVHP_E1_Analyze .....*Analyze gas coming through E1 after mixing*

CIVHP_E1_Feed .....*Analyze gas coming through E1 after mixing*
CIVHP_E1_Filt .....*Filter gas before feeding the reactor*
CIVHP_E1_Mix .....*Mix gas coming through E1*
CIVHP_E2_Feed .....*Nutrition of reactor CIVHP through branch E2*
CIVHP_E2_Mix .....*Mix products with water*
CIVHP_Product_plants_superiors .....*Greenhouse producting diversified biomass*
CIVHP_S1_Filt .....*Filtering of gas at the exit of reactor CIVHP*
CIVHP_S1_Modify_Temperature .....*Variation of gas temperature at the exit of reactor CIVHP*
CIVHP_S1_Pum .....*Pump of gas at the exit of reactor CIVHP*
CIVHP_S1_Stock .....*Container of water through branch S1*
CIVHP_S2.1_Crush .....*Crushing of eatable Biomass at the exit of reactor CIVHP*
CIVHP_S2.2_Treat .....*Treatment of eatable Biomass at the exit of reactor CIVHP*
CIVHP_S2_Stock .....*Storage pump mixing of reactor CIVHP*
CIV_E1_Feed .....*Nutrition in Nitrates of reactor CIV*
CIV_E1_Filt .....*Filtering of Nitrates*
CIV_E1_Stock .....*Container of Nitrates*
CIV_E2_Feed .....*Feed in CO2 and O2 (in Branch E2) reactor CIV*
CIV_E2_Filt .....*Filtering of CO2 in Branch E2*
CIV_E2_Stock .....*Container of CO2 in Branch E2*
CIV_E2__Analyze .....*Analysis of CO2 and O2 in Branch E2*
CIV_Product_biomass .....*Photosynthesis-product biomass from CO2, Nitrate and Light*
CIV_S1_Filt .....*Filtering of O2 at the exit of reactor CIV*
CIV_S1_Pum .....*Filtering of O2 at the exit of reactor CIV*
CIV_S1_Stock .....*Container of O2 at the exit of reactor CIV*
CIV_S1andE2_Feed_Analyzer .....*Feed in O2 (in Branch E2) Analyzer*
CIV_S2.1_Filt .....*Filtering of liquids at the exit of Separator*
CIV_S2.1_Stock .....*Storage of liquids*
CIV_S2.2_Stock .....*Storage of eatable Solids*
CIV_S2_Separate .....*Separate solids from liquids at the exit of Reactor CIV*
CIV_S2_Stock .....*Container of Spiruline and NO3 at the exit of Reactor CIV*
CI_E1_Mix .....*Mix and dilute the components*
CI_E1_Modify_temperature .....*Liquid-liquid Exchanger*
CI_E1_Pum .....*Supplying of the mixer*
CI_Product_VFA .....*Production of Volatil Fat Acid*
CI_S1_Filt .....*Filtering of the gas coming from Reactor_CI*
CI_S1_Pum .....*Pump of CO2*
CI_S2.1_Filt .....*Filter the liquids*
CI_S2.1_Modify_Temperature .....*Variation of temperature*
CI_S2.1_Stock .....*Storage of liquids (VFA)*
CI_S2.1_pum .....*Pump of liquids coming from Separator to CII*
CI_S2.1_sterilize .....*Sterilize the liquids*
CI_S2.2_stock .....*Storage of solids*
CI_S2_pum .....*Pump of liquids coming from reactor CI through S2*
CI_S2_separate .....*Separate liquids from solids*
EXT_FUNCTION_Nature .....*Function fictitious*

6.3.2 Functions description

Functions Description

C0_E1_Filt

Filtering of O2

- .....C0\C0_layer_functional_branch_E1.m3c.....3
- Input flow :CIV_C0_O2 CIVHP_C0_O2
- Output flow :C0_E1_O2_FILTER
- Used Equipment : C0_E1_Filter

C0_E2_Stock

Supply in eatable product of C0 reactor

- .....C0\C0_layer_functional_branch_E2.m3c.....3
- Input flow :EXT_C0_BIOMASS_EAT CIVHP_C0_H2O CIV_C0_BIOMASS_EAT CIVHP_C0_BIOMASS_EAT
- Output flow :C0_E2_BIOMASSandWATER_STOCK
- Used Equipment : C0_E2_Buffer

C0_OfferVitalSpace

Offer a vital space to the crew (air, water, food)

- .....C0\C0_layer_functional2.m3c.....7
- Input flow :C0_E1_O2_FILTER C0_E2_BIOMASSandWATER_STOCK
- Output flow :C0_S1_CO2_PRODUCT C0_S2_FAECESandURINE_PRODUCT
- Used Equipment : C0_Reactor

C0_S1_Filt

Filtering of CO2 outside the C0 reactor

- .....C0\C0_layer_functional_branch_S1.m3c.....3
- Input flow :C0_S1_CO2_PRODUCT
- Output flow :C0_S1_CO2_FILTER
- Used Equipment : C0_S1_Filter

C0_S1_Pum

Pump of CO2 outside the C0 reactor

- .....C0\C0_layer_functional_branch_S1.m3c.....10
- Input flow :C0_S1_CO2_FILTER
- Output flow :C0_CIVHP_CO2
- Used Equipment : C0_S1_Pump

C0_S2.1_CI_Evacuate

Evacuations of URINES to compartment CI

- .....C0\C0_layer_functional_branch_S2.m3c.....31
- Input flow :C0_S2.1_URINE_STOCK
- Output flow :C0_CI_URINE

- Used Equipment : C0_S2.1_Pump

C0_S2.1_CI_Filt

Filtering of the supply liquid of separator

- .....C0\C0_layer_functional_branch_S2.m3c.....17
- Input flow :C0_S2.1_URINE_SEPARATE
- Output flow :C0_S2.1_URINE_FILTER
- Used Equipment : C0_S2.1_Filter

C0_S2.1_CI_Stock

Container of URINES

- .....C0\C0_layer_functional_branch_S2.m3c.....24
- Input flow :C0_S2.1_URINE_FILTER
- Output flow :C0_S2.1_URINE_STOCK
- Used Equipment : C0_S2.1_Buffer

C0_S2.2_Mix

Mix the solid products with water (de CIVHP)

- .....C0\C0_layer_functional_branch_S2.m3c.....38
- Input flow :C0_S2.2_FAECES_SEPARATE CIVHP_C0_WATER
- Output flow :C0_CI_FAECES
- Used Equipment : C0_S2.2_Mixer

C0_S2_Separate

Analysis of supplying mixture of the C0 reactor

- .....C0\C0_layer_functional_branch_S2.m3c.....10
- Input flow :C0_S2_FAECESandURINE_STOCK
- Output flow :C0_S2.1_URINE_SEPARATE C0_S2.2_FAECES_SEPARATE
- Used Equipment : C0_S2_Separator

C0_S2_Stock

Container of the mixtures outside the C0 Reactor

- .....C0\C0_layer_functional_branch_S2.m3c.....3
- Input flow :C0_S2_FAECESandURINE_PRODUCT
- Output flow :C0_S2_FAECESandURINE_STOCK
- Used Equipment : C0_S2_Buffer

CIII_E1_Analyze

Analysis of liquids

- .....CIII\CIII_layer_functional_branch_E1.m3c.....9
- Input flow :CIII_E1_NH3_FILTER
- Output flow :CIII_E1_NH3_ANALYZE
- Used Equipment : CIII_E1_Analyzer

CIII_E1_Filt

Filtering of NH3

- .....CIII\CIII_layer_functional_branch_E1.m3c.....2

- Input flow :CII_CIII_NH3
- Output flow :CIII_E1_NH3_FILTER
- Used Equipment : CIII_E1_Filter

CIII_E1_Pum

Nutrition of the Reactor CIII of NH3 filtered and analyzed

- .....CIII\CIII_layer_functional_branch_E1.m3c.....16
- Input flow :CIII_E1_NH3_ANALYZE
- Output flow :CIII_E1_NH3_ACCEPT
- Used Equipment : CIII_E1_Pump

CIII_E2_Analyze

Analysis of O2

- .....CIII\CIII_layer_functional_branch_E2.m3c.....2
- Input flow :CIVHP_CIII_O2
- Output flow :CIII_E2_O2_ANALYZE
- Used Equipment : CIII_E2_Analyzer

CIII_E2_Filt

Filtering de O2 and CO2

- .....CIII\CIII_layer_functional_branch_E2.m3c.....16
- Input flow :CIII_E2_O2_ACCEPT CIII_S1andE2_CO2_PRODUCT
- Output flow :CIII_E2_O2andCO2_FILTER
- Used Equipment : CIII_E2_Filter

CIII_E2_Pum

Nutrition of Reactor CIII in O2 before filtering

- .....CIII\CIII_layer_functional_branch_E2.m3c.....9
- Input flow :CIII_E2_O2_ANALYZE
- Output flow :CIII_E2_O2_ACCEPT
- Used Equipment : CIII_E2_Pump

CIII_Reaction

Reaction of CIII

- .....CIII\CIII_layer_functional2.m3c.....7
- Input flow :CIII_E1_NH3_ACCEPT CIII_E2_O2andCO2_FILTER CIII_S2andE1_NO3andWASTE_ACCEPT
- Output flow :CIII_S1_CO2_PRODUCT CIII_S1andE2_CO2_PRODUCT CIII_S2_NO3andWASTE_PRODUCT CIII_S2andE1_NO3andWASTE_PRODUCT
- Used Equipment : CIII_Reactor

CIII_S1_Filt

Filtering of CO2 at the exit of Reactor CIII

- .....CIII\CIII_layer_functional_branch_S1.m3c.....2
- Input flow :CIII_S1_CO2_PRODUCT
- Output flow :CIII_S1_CO2_FILTER
- Used Equipment : CIII_S1_Filter

CIII_S1_Pum

Pump of CO2 at the exit of Reactor CIII

- .....CIII\CIII_layer_functional_branch_S1.m3c.....9
- Input flow :CIII_S1_CO2_FILTER
- Output flow :CIII_CIV_CO2
- Used Equipment : CIII_S1_Pump

CIII_S2.1_Analyze

Analysis of liquids

- .....CIII\CIII_layer_functional_branch_S2.m3c.....30
- Input flow :CIII_S2.1_NO3_STOCK
- Output flow :CIII_CIV_NO3
- Used Equipment : CIII_S2.1_Analyzer

CIII_S2.1__Stock

Stock of liquids

- .....CIII\CIII_layer_functional_branch_S2.m3c.....23
- Input flow :CIII_S2.1_NO3_SEPARATE
- Output flow :CIII_S2.1_NO3_STOCK
- Used Equipment : CIII_S2.1_Buffer

CIII_S2.2_Stock

Stock of liquids

- .....CIII\CIII_layer_functional_branch_S2.m3c.....37
- Input flow :CIII_S2.2_WASTE_SEPARATE
- Output flow :CIII_EXT_WASTE
- Used Equipment : CIII_S2.2_Buffer

CIII_S2_Pum

Pump of the liquids at the exit of Reactor CIII

- .....CIII\CIII_layer_functional_branch_S2.m3c.....9
- Input flow :CIII_S2_NO3andWASTE_PRODUCT
- Output flow :CIII_S2_NO3andWASTE_EVACUATE
- Used Equipment : CIII_S2_Pump

CIII_S2_Separate

Separation of liquids and solids

- .....CIII\CIII_layer_functional_branch_S2.m3c.....16
- Input flow :CIII_S2_NO3andWASTE_EVACUATE
- Output flow :CIII_S2.1_NO3_SEPARATE CIII_S2.2_WASTE_SEPARATE
- Used Equipment : CIII_S2_Separator

CIII_S2andE1_Pum

Recycling of the liquid coming from Reactor CIII

- .....CIII\CIII_layer_functional_branch_S2.m3c.....2
- Input flow :CIII_S2andE1_NO3andWASTE_PRODUCT

- Output flow :CIII_S2andE1_NO3andWASTE_ACCEPT
- Used Equipment : CIII_S2andE1_Pump

CII_E1_Analyze

Analysis of pump gas from reactor II

- .....CII\CII_layer_functional_branch_E1.m3c.....3
- Input flow :CI_CII_VFA
- Output flow :CII_E1_VFA_ANALYSIS
- Used Equipment : CII_E1_Analyzer

CII_E1_Feed

Liquid nutrition of reactor II

- .....CII\CII_layer_functional_branch_E1.m3c.....17
- Input flow :CII_E1_VFA_FILTER
- Output flow :CII_E1_VFA_ACCEPT
- Used Equipment : CII_E1_Pump

CII_E1_Filt

Filtering of liquid nutrition of reactor II

- .....CII\CII_layer_functional_branch_E1.m3c.....10
- Input flow :CII_E1_VFA_ANALYSIS
- Output flow :CII_E1_VFA_FILTER
- Used Equipment : CII_E1_Filter

CII_E2_Feed

Gas nutrition of the reactor II

- .....CII\CII_layer_functional_branch_E2.m3c.....3
- Input flow :CI_CII_CO2
- Output flow :CII_E2_CO2_ACCEPT
- Used Equipment : CII_E2_Pump

CII_E2_Filt

Filtering of gas nutrition of the reactor II

- .....CII\CII_layer_functional_branch_E2.m3c.....10
- Input flow :CII_E2_CO2_ACCEPT
- Output flow :CII_E2_CO2_FILTER
- Used Equipment : CII_E2_Filter

CII_Rhodobacter_reactor_II

Transform FAT into ammonium

- .....CII\CII_layer_functional2.m3c.....7
- Input flow :CII_E1_VFA_ACCEPT CII_E2_CO2_FILTER
- Output flow :CII_S1_CO2_PRODUCT CII_S2_BIOMASSandNH3_PRODUCT
- Used Equipment : CII_Reactor

CII_S1_Analyze

Analysis gas pumping from reactor II

- .....CII\CII_layer_functional_branch_S1.m3c.....11
- Input flow :CII_S1_CO2_FILTER
- Output flow :CII_S1_CO2_ANALYZE
- Used Equipment : CII_S1_Analyzer

CII_S1_Filt

Filtering of gas pumping c II

- .....CII\CII_layer_functional_branch_S1.m3c.....4
- Input flow :CII_S1_CO2_PRODUCT
- Output flow :CII_S1_CO2_FILTER
- Used Equipment : CII_S1_Filter

CII_S1_Pum

Gas Pump from reactor II

- .....CII\CII_layer_functional_branch_S1.m3c.....18
- Input flow :CII_S1_CO2_ANALYZE
- Output flow :CII_CIVHP_CO2
- Used Equipment : CII_S1_Pump

CII_S2.1_Analyze

Analysis of liquid pumpig from separator

- .....CII\CII_layer_functional_branch_S2.m3c.....31
- Input flow :CII_S2.1_NH3_FILTER
- Output flow :CII_S2.1_NH3_ANALYZE
- Used Equipment : CII_S2.1_Analyzer

CII_S2.1_Filt

Filtering of liquid pumping from separator

- .....CII\CII_layer_functional_branch_S2.m3c.....24
- Input flow :CII_S2.1_NH3_SEPARATE
- Output flow :CII_S2.1_NH3_FILTER
- Used Equipment : CII_S2.1_Filter

CII_S2.1_Stock

Storage of liquid pumpig from separator

- .....CII\CII_layer_functional_branch_S2.m3c.....38
- Input flow :CII_S2.1_NH3_ANALYZE
- Output flow :CII_CIII_NH3
- Used Equipment : CII_S2.1_Buffer

CII_S2.2_Stock

Storage of solid pumpig from separator

- .....CII\CII_layer_functional_branch_S2.m3c.....45
- Input flow :CII_S2.2_BIOMASS_SEPARATE
- Output flow :CII_CI_BIOMASS_NEAT
- Used Equipment : CII_S2.2_Buffer

CII_S2_Analyze

Analysis liquid pumping from reactor II

- .....CII\CII_layer_functional_branch_S2.m3c.....10
- Input flow :CII_S2_BIOMASSandNH3_STOCK
- Output flow :CII_S2_BIOMASSandNH3_ANALYZE
- Used Equipment : CII_S2_Analyzer

CII_S2_Separate

Separation liquid-solid

- .....CII\CII_layer_functional_branch_S2.m3c.....17
- Input flow :CII_S2_BIOMASSandNH3_ANALYZE
- Output flow :CII_S2.1_NH3_SEPARATE CII_S2.2_BIOMASS_SEPARATE
- Used Equipment : CII_S2_Separator

CII_S2_Stock

Storage liquid pumping from reactor II

- .....CII\CII_layer_functional_branch_S2.m3c.....3
- Input flow :CII_S2_BIOMASSandNH3_PRODUCT
- Output flow :CII_S2_BIOMASSandNH3_STOCK
- Used Equipment : CII_S2_Buffer

CIVHP_E1_Analyze

Analyze gas coming through E1 after mixing

- .....CIVHP\CIVHP_layer_functional_branch_E1.m3c.....10
- Input flow :CIVHP_E1_CO2andO2_MIX
- Output flow :CIVHP_E1_CO2andO2_ANALYZE
- Used Equipment : CIVHP_E1_Analyzer

CIVHP_E1_Feed

Analyze gas coming through E1 after mixing

- .....CIVHP\CIVHP_layer_functional_branch_E1.m3c.....17
- Input flow :CIVHP_E1_CO2andO2_ANALYZE
- Output flow :CIVHP_E1_CO2andO2_ACCEPT
- Used Equipment : CIVHP_E1_Pump

CIVHP_E1_Filt

Filter gas before feeding the reactor

- .....CIVHP\CIVHP_layer_functional_branch_E1.m3c.....24
- Input flow :CIVHP_E1_CO2andO2_ACCEPT
- Output flow :CIVHP_E1_CO2andO2_FILTER
- Used Equipment : CIVHP_E1_Filter

CIVHP_E1_Mix

Mix gas coming through E1

- .....CIVHP\CIVHP_layer_functional_branch_E1.m3c.....3
- Input flow :CI_CIVHP_CO2 C0_CIVHP_CO2 CII_CIVHP_CO2 CIV_CIVHP_O2 EXT_CIVHP_CO2
- Output flow :CIVHP_E1_CO2andO2_MIX

- Used Equipment : CIVHP_E1_Mixer

CIVHP_E2_Feed

Nutrition of reactor CIVHP through branch E2

- .....CIVHP\CIVHP_layer_functional_branch_E2.m3c.....10
- Input flow :CIVHP_E2_H2OandNO3_MIX
- Output flow :CIVHP_E2_H2OandNO3_ACCEPT
- Used Equipment : CIVHP_E2_Pump

CIVHP_E2_Mix

Mix products with water

- .....CIVHP\CIVHP_layer_functional_branch_E2.m3c.....3
- Input flow :CIVHP_S1andE2_H2O_STOCK CIV_CIVHP_NO3
- Output flow :CIVHP_E2_H2OandNO3_MIX
- Used Equipment : CIVHP_E2_Mixer

CIVHP_Product_plants_superiors

Greenhouse producting diversified biomass

- .....CIVHP\CIVHP_layer_functional2.m3c.....7
- Input flow :CIVHP_E1_CO2andO2_FILTER CIVHP_E2_H2OandNO3_ACCEPT
- Output flow :CIVHP_S2_BIOMASS_PRODUCT CIVHP_S1_H2OandO2_PRODUCT
- Used Equipment : CIVHP_Reactor

CIVHP_S1_Filt

Filtering of gas at the exit of reactor CIVHP

- .....CIVHP\CIVHP_layer_functional_branch_S1.m3c.....3
- Input flow :CIVHP_S1_H2OandO2_PRODUCT
- Output flow :CIVHP_S1_H2OandO2_FILTER
- Used Equipment : CII_S1_Filter

CIVHP_S1_Modify_Temperature

Variation of gas temperature at the exit of reactor CIVHP

- .....CIVHP\CIVHP_layer_functional_branch_S1.m3c.....17
- Input flow :CIVHP_S1_H2OandO2_EVACUATE
- Output flow :CIVHP_C0_O2 CIVHP_CIII_O2 CIVHP_EXT_O2 CIVHP_S1_H2O_CONDENSE CIVHP_C0_H2O
- Used Equipment : CIVHP_S1_Exchanger

CIVHP_S1_Pum

Pump of gas at the exit of reactor CIVHP

- .....CIVHP\CIVHP_layer_functional_branch_S1.m3c.....10
- Input flow :CIVHP_S1_H2OandO2_FILTER
- Output flow :CIVHP_S1_H2OandO2_EVACUATE
- Used Equipment : CII_S1_Pump

CIVHP_S1_Stock

Container of water through branch S1

- .....CIVHP\CIVHP_layer_functional_branch_S1.m3c.....24
- Input flow :CIVHP_S1_H2O_CONDENSE
- Output flow :CIVHP_S1andE2_H2O_STOCK CIVHP_C0_WATER
- Used Equipment : CIVHP_S1_Buffer

CIVHP_S2.1_Crush

Crushing of eatable Biomass at the exit of reactor CIVHP

- .....CIVHP\CIVHP_layer_functional_branch_S2.m3c.....10
- Input flow :CIVHP_S2.1_BIOMASS_NEAT_STOCKED
- Output flow :CIVHP_CI_BIOMASS_NEAT
- Used Equipment : CIVHP_S2.1_Crusher

CIVHP_S2.2_Treat

Treatment of eatable Biomass at the exit of reactor CIVHP

- .....CIVHP\CIVHP_layer_functional_branch_S2.m3c.....17
- Input flow :CIVHP_S2.2_BIOMASS_EAT_STOCKED
- Output flow :CIVHP_C0_BIOMASS_EAT
- Used Equipment : CIVHP_S2.2_Treatment

CIVHP_S2_Stock

Storage pump mixing of reactor CIVHP

- .....CIVHP\CIVHP_layer_functional_branch_S2.m3c.....3
- Input flow :CIVHP_S2_BIOMASS_PRODUCT
- Output flow :CIVHP_EXT_WASTE CIVHP_S2.1_BIOMASS_NEAT_STOCKED CIVHP_S2.2_BIOMASS_EAT_STOCKED
- Used Equipment : CIVHP_S2_Buffer

CIV_E1_Feed

Nutrition in Nitrates of reactor CIV

- .....CIV\CIV_layer_functional_branch_E1.m3c.....17
- Input flow :CIV_E1_NO3_STOCK
- Output flow :CIV_E1_NO3_ACCEPT
- Used Equipment : CIV_E1_Pump

CIV_E1_Filt

Filtering of Nitrates

- .....CIV\CIV_layer_functional_branch_E1.m3c.....3
- Input flow :CIII_CIV_NO3
- Output flow :CIV_E1_NO3_FILTER
- Used Equipment : CIV_E1_Filter

CIV_E1_Stock

Container of Nitrates

- .....CIV\CIV_layer_functional_branch_E1.m3c.....10
- Input flow :CIV_E1_NO3_FILTER
- Output flow :CIV_E1_NO3_STOCK
- Used Equipment : CIV_E1_Buffer

CIV_E2_Feed

Feed in CO2 and O2 (in Branch E2) reactor CIV

- .....CIV\CIV_layer_functional_branch_E2.m3c.....24
- Input flow :CIV_E2_CO2andO2_ANALYZE
- Output flow :CIV_E2_CO2andO2_ACCEPT
- Used Equipment : CIV_E2_Pump

CIV_E2_Filt

Filtering of CO2 in Branch E2

- .....CIV\CIV_layer_functional_branch_E2.m3c.....31
- Input flow :CIV_E2_CO2andO2_ACCEPT
- Output flow :CIV_E2_CO2andO2_FILTER
- Used Equipment : CIV_E2_Filter

CIV_E2_Stock

Container of CO2 in Branch E2

- .....CIV\CIV_layer_functional_branch_E2.m3c.....3
- Input flow :CI_CIV_CO2 CIII_CIV_CO2
- Output flow :CIV_E2_CO2_STOCK
- Used Equipment : CIV_E2_Buffer

CIV_E2__Analyze

Analysis of CO2 and O2 in Branch E2

- .....CIV\CIV_layer_functional_branch_E2.m3c.....17
- Input flow :CIV_E2_CO2_STOCK CIV_S1andE2_O2_ACCEPT
- Output flow :CIV_E2_CO2andO2_ANALYZE
- Used Equipment : CIV_E2_Analyzer

CIV_Product_biomass

Photosynthesis-product biomass from CO2, Nitrate and Light

- .....CIV\CIV_layer_functional2.m3c.....7
- Input flow :CIV_E1_NO3_ACCEPT CIV_E2_CO2andO2_FILTER
- Output flow :CIV_S2_BIOMASSandNO3_PRODUCT CIV_S1_O2_PRODUCT CIV_S1andE2_O2_PRODUCT
- Used Equipment : CIV_Reactor

CIV_S1_Filt

Filtering of O2 at the exit of reactor CIV

- .....CIV\CIV_layer_functional_branch_S1.m3c.....3
- Input flow :CIV_S1_O2_PRODUCT
- Output flow :CIV_S1_O2_FILTER
- Used Equipment : CIV_S1_Filter

CIV_S1_Pum

Filtering of O2 at the exit of reactor CIV

- .....CIV\CIV_layer_functional_branch_S1.m3c.....10

- Input flow :CIV_S1_O2_FILTER
- Output flow :CIV_S1_O2_EVACUATE
- Used Equipment : CIV_S1_Pump

CIV_S1_Stock

Container of O2 at the exit of reactor CIV

- .....CIV\CIV_layer_functional_branch_S1.m3c.....17
- Input flow :CIV_S1_O2_EVACUATE
- Output flow :CIV_C0_O2 CIV_CIVHP_O2
- Used Equipment : CIV_S1_Buffer

CIV_S1andE2_Feed_Analyzer

Feed in O2 (in Branch E2) Analyzer

- .....CIV\CIV_layer_functional_branch_E2.m3c.....10
- Input flow :CIV_S1andE2_O2_PRODUCT
- Output flow :CIV_S1andE2_O2_ACCEPT
- Used Equipment : CIV_S1andE2_Pump

CIV_S2.1_Filt

Filtering of liquids at the exit of Separator

- .....CIV\CIV_layer_functional_branch_S2.m3c.....24
- Input flow :CIV_S2.1_NO3_SEPARATE
- Output flow :CIV_S2.1_NO3_FILTER
- Used Equipment : CIV_S2.1_Filter

CIV_S2.1_Stock

Storage of liquids

- .....CIV\CIV_layer_functional_branch_S2.m3c.....31
- Input flow :CIV_S2.1_NO3_FILTER
- Output flow :CIV_CIVHP_NO3
- Used Equipment : CIV_S2.1_Buffer

CIV_S2.2_Stock

Storage of eatable Solids

- .....CIV\CIV_layer_functional_branch_S2.m3c.....17
- Input flow :CIV_S2.2_BIOMASS_SEPARATE
- Output flow :CIV_C0_BIOMASS_EAT CIV_CI_BIOMASS_SPIRU
- Used Equipment : CIV_S2.2_Buffer

CIV_S2_Separate

Separate solids from liquids at the exit of Reactor CIV

- .....CIV\CIV_layer_functional_branch_S2.m3c.....10
- Input flow :CIV_S2_BIOMASSandNO3_STOCK
- Output flow :CIV_S2.1_NO3_SEPARATE CIV_S2.2_BIOMASS_SEPARATE
- Used Equipment : CIV_S2_Separator

CIV_S2_Stock

Container of Spiruline and NO3 at the exit of Reactor CIV

- .....CIV\CIV_layer_functional_branch_S2.m3c.....3
- Input flow :CIV_S2_BIOMASSandNO3_PRODUCT
- Output flow :CIV_S2_BIOMASSandNO3_STOCK
- Used Equipment : CIV_S2_Buffer

CI_E1_Mix

Mix and dilute the components

- .....CI\CI_layer_functional_branch_E1.m3c.....3
- Input flow :C0_CI_FAECES CII_CI_BIOMASS_NEAT CIVHP_CI_BIOMASS_NEAT CIV_CI_BIOMASS_SPIRU C0_CI_URINE
- Output flow :CI_E1_BIOMASSandFAECESandURINE_MIXED
- Used Equipment : CI_E1_Mixer

CI_E1_Modify_temperature

Liquid-liquid Exchanger

- .....CI\CI_layer_functional_branch_E1.m3c.....17
- Input flow :CI_E1_BIOMASSandFAECESandURINE_PUMP
- Output flow :CI_E1_BIOMASSandFAECESandURINE_TEMPERATE
- Used Equipment : CI_E1_Exchanger

CI_E1_Pum

Supplying of the mixer

- .....CI\CI_layer_functional_branch_E1.m3c.....10
- Input flow :CI_E1_BIOMASSandFAECESandURINE_MIXED
- Output flow :CI_E1_BIOMASSandFAECESandURINE_PUMP
- Used Equipment : CI_E1_Pump

CI_Product_VFA

Production of Volatil Fat Acid

- .....CI\CI_layer_functional2.m3c.....8
- Input flow :CI_E1_BIOMASSandFAECESandURINE_TEMPERATE
- Output flow :CI_S1_CO2_PRODUCT CI_S2_VFAandWASTE_PRODUCT
- Used Equipment : CI_Reactor

CI_S1_Filt

Filtering of the gas coming from Reactor_CI

- .....CI\CI_layer_functional_branch_S1.m3c.....3
- Input flow :CI_S1_CO2_PRODUCT
- Output flow :CI_S1_CO2_FILTER
- Used Equipment : CI_S1_Filter

CI_S1_Pum

Pump of CO2

- .....CI\CI_layer_functional_branch_S1.m3c.....10
- Input flow :CI_S1_CO2_FILTER

- Output flow :CI_CII_CO2 CI_CIV_CO2 CI_CIVHP_CO2
- Used Equipment : CI_S1_Pump

CI_S2.1_Filt

Filter the liquids

- .....CI\CI_layer_functional_branch_S2.m3c.....39
- Input flow :CI_S2.1_VFA_STERILIZE
- Output flow :CI_S2.1_VFA_FILTER
- Used Equipment : CI_S2.1_Filter

CI_S2.1_Modify_Temperature

Variation of temperature

- .....CI\CI_layer_functional_branch_S2.m3c.....18
- Input flow :CI_S2.1_VFA_SEPARATE
- Output flow :CI_S2.1_VFA_TEMPERATE
- Used Equipment : CI_S2.1_Exchanger

CI_S2.1_Stock

Storage of liquids (VFA)

- .....CI\CI_layer_functional_branch_S2.m3c.....46
- Input flow :CI_S2.1_VFA_FILTER
- Output flow :CI_CII_VFA
- Used Equipment : CI_S2.1_Buffer

CI_S2.1_pum

Pump of liquids coming from Separator to CII

- .....CI\CI_layer_functional_branch_S2.m3c.....25
- Input flow :CI_S2.1_VFA_TEMPERATE
- Output flow :CI_S2.1_VFA_EVACUATE
- Used Equipment : CI_S2.1_Pump

CI_S2.1_sterilize

Sterilize the liquids

- .....CI\CI_layer_functional_branch_S2.m3c.....32
- Input flow :CI_S2.1_VFA_EVACUATE
- Output flow :CI_S2.1_VFA_STERILIZE
- Used Equipment : CI_S2.1_Sterilizer_UV

CI_S2.2_stock

Storage of solids

- .....CI\CI_layer_functional_branch_S2.m3c.....53
- Input flow :CI_S2.2_WASTE_SEPARATE
- Output flow :CI_EXT_WASTE
- Used Equipment : CI_S2.2_Buffer

CI_S2_pum

Pump of liquids coming from reactor CI through S2

- .....CI\CI_layer_functional_branch_S2.m3c.....4
- Input flow :CI_S2_VFAandWASTE_PRODUCT
- Output flow :CI_S2_VFAandWASTE_EVACUATE
- Used Equipment : CI_S2_Pump

CI_S2_separate

Separate liquids from solids

- .....CI\CI_layer_functional_branch_S2.m3c.....11
- Input flow :CI_S2_VFAandWASTE_EVACUATE
- Output flow :CI_S2.1_VFA_SEPARATE CI_S2.2_WASTE_SEPARATE
- Used Equipment : CI_S2_Solid_Separator

EXT_FUNCTION_Nature

Function fictitious

- .....EXT\EXT_compartment_fictitious.m3c.....8
- Input flow :
- Output flow :EXT_C0_BIOMASS_EAT EXT_CIVHP_CO2
- Used Equipment : EXT_EQUIPMENT_Nature

6.4 Links

6.4.1 Link tree structure

Links Tree Structure

Gas .....*Gas*
Liquid .....*Liquid*
Solid .....*Solid*

6.4.2 Links description

Links Description

Gas

Gas

- .....COMMON\Links_common.m3c.....5
- No father.
- Equipment in contact :C0_Reactor C0_E1_Filter C0_S1_Filter C0_S1_Pump CI_Reactor CI_S1_Pump CI_S1_Filter CII_Reactor CII_E2_Pump CII_E2_Filter CII_S1_Filter CII_S1_Analyzer CII_S1_Pump CIII_Reactor CIII_E2_Analyzer CIII_E2_Pump CIII_E2_Filter CIII_S1_Filter CIII_S1_Pump CIV_Reactor CIV_E2_Buffer CIV_E2_Analyzer CIV_E2_Pump CIV_E2_Filter CIV_S1andE2_Pump CIV_S1_Filter CIV_S1_Pump CIV_S1_Buffer CIVHP_Reactor CIVHP_E1_Mixer CIVHP_E1_Analyzer CIVHP_E1_Pump CIVHP_E1_Filter CIVHP_E2_Mixer CIVHP_E2_Pump CIVHP_S1_Filter CIVHP_S1_Pompe CIVHP_S1_Exchanger EXT_EQUIPMENT_Nature
- Supported flows : EXT_CIVHP_CO2 C0_CIVHP_CO2 CI_CII_CO2 CI_CIV_CO2 CI_CIVHP_CO2 CII_CIVHP_CO2 CIII_CIV_CO2 CIV_CIVHP_O2 CIV_C0_O2 CIVHP_CIII_O2 CIVHP_C0_O2 CIVHP_EXT_O2 C0_E1_O2_FILTER C0_S1_CO2_PRODUCT C0_S1_CO2_FILTER CI_S1_CO2_PRODUCT CI_S1_CO2_FILTER CII_E2_CO2_ACCEPT CII_E2_CO2_FILTER CII_S1_CO2_PRODUCT CII_S1_CO2_FILTER CII_S1_CO2_ANALYZE CIII_E2_O2_ANALYZE CIII_E2_O2_ACCEPT CIII_E2_O2andCO2_FILTER CIII_S1andE2_CO2_PRODUCT CIII_S1_CO2_PRODUCT CIII_S1_CO2_FILTER CIV_S1andE2_O2_PRODUCT CIV_S1andE2_O2_ACCEPT CIV_E2_CO2_STOCK CIV_E2_CO2andO2_ANALYZE CIV_E2_CO2andO2_ACCEPT CIV_E2_CO2andO2_FILTER CIV_S1_O2_PRODUCT CIV_S1_O2_FILTER CIV_S1_O2_EVACUATE CIVHP_E1_CO2andO2_MIX CIVHP_E1_CO2andO2_ANALYZE CIVHP_E1_CO2andO2_ACCEPT CIVHP_E1_CO2andO2_FILTER CIVHP_E2_H2OandNO3_ACCEPT CIVHP_S1_H2OandO2_PRODUCT CIVHP_S1_H2OandO2_FILTER CIVHP_S1_H2OandO2_EVACUATE
- Control Flows supported :

Liquid

Liquid

- .....COMMON\Links_common.m3c.....9
- No father.
- Equipment in contact :C0_Reactor C0_E2_Buffer C0_S2_Buffer C0_S2_Separator C0_S2.1_Filter C0_S2.1_Buffer C0_S2.1_Pump C0_S2.2_Mixer CI_Reactor CI_E1_Mixer CI_E1_Pump CI_E1_Exchanger CI_S2_Pump CI_S2_Solid_Separator CI_S2.1_Exchanger CI_S2.1_Pump CI_S2.1_Sterilizer_UV CI_S2.1_Filter CI_S2.1_Buffer CII_Reactor CII_E1_Analyzer CII_E1_Filter CII_E1_Pump CII_S2_Buffer CII_S2_Analyzer CII_S2_Separator CII_S2.1_Filter CII_S2.1_Analyzer CII_S2.1_Buffer CIII_Reactor CIII_E1_Filter CIII_E1_Analyzer CIII_E1_Pump CIII_S2_Pump CIII_S2_Separator CIII_S2.1_Buffer CIII_S2.1_Analyzer CIII_S2andE1_Pump CIV_Reactor CIV_E1_Filter CIV_E1_Buffer CIV_E1_Pump CIV_S2_Buffer CIV_S2_Separator CIV_S2.1_Filter CIV_S2.1_Buffer CIVHP_Reactor CIVHP_E2_Mixer CIVHP_E2_Pump CIVHP_S1_Exchanger CIVHP_S1_Buffer CIVHP_S2_Buffer EXT_EQUIPMENT_Nature
- Supported flows : C0_CI_URINE CI_CII_VFA CII_CIII_NH3 CIII_CIV_NO3 CIV_CIVHP_NO3 CIVHP_C0_H2O CIVHP_C0_WATER C0_E2_BIOMASSandWATER_STOCK C0_S2_FAECESandURINE_PRODUCT C0_S2_FAECESandURINE_STOCK C0_S2.1_URINE_SEPARATE C0_S2.1_URINE_FILTER C0_S2.1_URINE_STOCK CI_E1_BIOMASSandFAECESandURINE_MIXED CI_E1_BIOMASSandFAECESandURINE_PUMP CI_E1_BIOMASSandFAECESandURINE_TEMPERATE CI_S2_VFAandWASTE_PRODUCT

CI_S2_VFAandWASTE_EVACUATE CI_S2.1_VFA_SEPARATE CI_S2.1_VFA_TEMPERATE CI_S2.1_VFA_EVACUATE CI_S2.1_VFA_STERILIZE CI_S2.1_VFA_FILTER CII_E1_VFA_ANALYSIS CII_E1_VFA_FILTER CII_E1_VFA_ACCEPT CII_S2_BIOMASSandNH3_PRODUCT CII_S2_BIOMASSandNH3_STOCK CII_S2_BIOMASSandNH3_ANALYZE CII_S2.1_NH3_SEPARATE CII_S2.1_NH3_FILTER CII_S2.1_NH3_ANALYZE CIII_E1_NH3_FILTER CIII_E1_NH3_ANALYZE CIII_E1_NH3_ACCEPT CIII_S2_NO3andWASTE_PRODUCT CIII_S2_NO3andWASTE_EVACUATE CIII_S2andE1_NO3andWASTE_PRODUCT CIII_S2andE1_NO3andWASTE_ACCEPT CIII_S2.1_NO3_SEPARATE CIII_S2.1_NO3_STOCK CIV_E1_NO3_FILTER CIV_E1_NO3_STOCK CIV_E1_NO3_ACCEPT CIV_S2_BIOMASSandNO3_STOCK CIV_S2_BIOMASSandNO3_PRODUCT CIV_S2.1_NO3_SEPARATE CIV_S2.1_NO3_FILTER CIVHP_E2_H2OandNO3_MIX CIVHP_E2_H2OandNO3_ACCEPT CIVHP_S1_H2O_CONDENSE CIVHP_S1andE2_H2O_STOCK

- Control Flows supported :

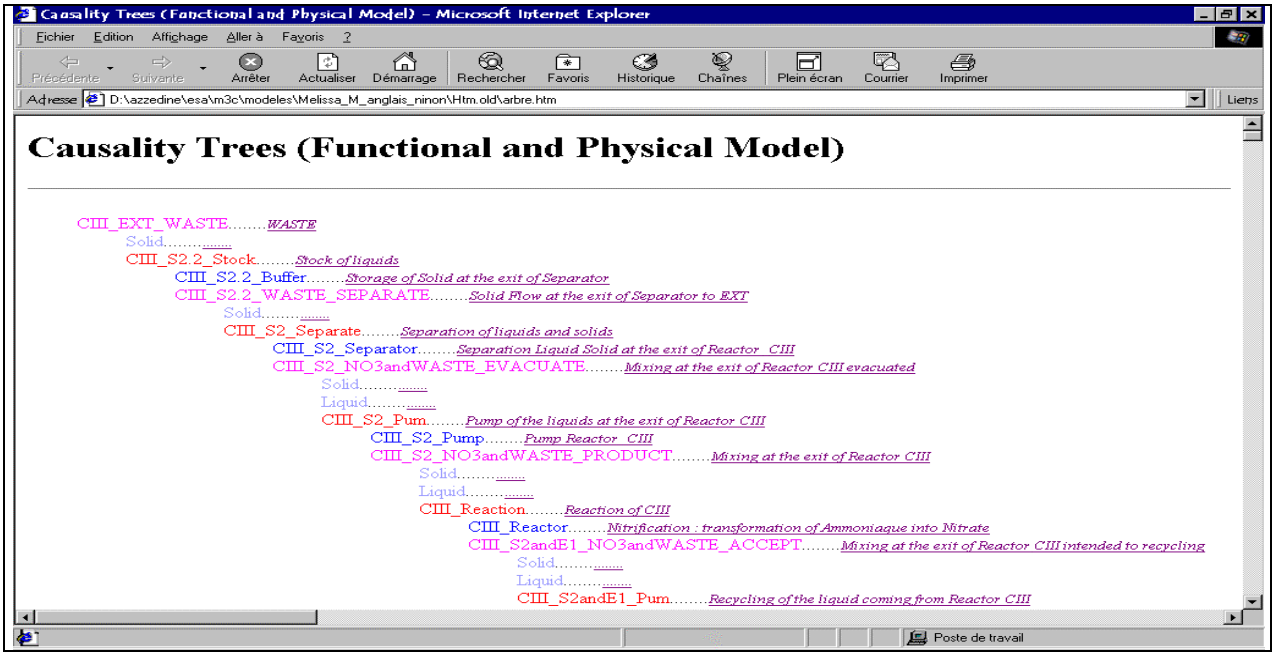
Solid

Solid

- .....COMMON\Links_common.m3c.....13
- No father.
- Equipment in contact :C0_Reactor C0_E2_Buffer C0_S2_Buffer C0_S2_Separator C0_S2.2_Mixer CI_Reactor CI_E1_Mixer CI_E1_Pump CI_E1_Exchanger CI_S2_Pump CI_S2_Solid_Separator CI_S2.2_Buffer CII_Reactor CII_S2_Buffer CII_S2_Analyzer CII_S2_Separator CII_S2.2_Buffer CIII_Reactor CIII_S2_Pump CIII_S2_Separator CIII_S2.2_Buffer CIII_S2andE1_Pump CIV_Reactor CIV_S2_Buffer CIV_S2_Separator CIV_S2.2_Buffer CIVHP_Reactor CIVHP_E2_Mixer CIVHP_E2_Pump CIVHP_S2_Buffer CIVHP_S2.1_Crusher CIVHP_S2.2_Treatment EXT_EQUIPMENT_Nature
- Supported flows : EXT_C0_BIOMASS_EAT C0_CI_FAECES CI_EXT_WASTE CII_CI_BIOMASS_NEAT CIII_EXT_WASTE CIV_C0_BIOMASS_EAT CIV_CI_BIOMASS_SPIRU CIVHP_CI_BIOMASS_NEAT CIVHP_C0_BIOMASS_EAT CIVHP_EXT_WASTE C0_E2_BIOMASSandWATER_STOCK C0_S2_FAECESandURINE_PRODUCT C0_S2_FAECESandURINE_STOCK C0_S2.2_FAECES_SEPARATE CI_E1_BIOMASSandFAECESandURINE_MIXED CI_E1_BIOMASSandFAECESandURINE_PUMP CI_E1_BIOMASSandFAECESandURINE_TEMPERATE CI_S2_VFAandWASTE_PRODUCT CI_S2_VFAandWASTE_EVACUATE CI_S2.2_WASTE_SEPARATE CII_S2_BIOMASSandNH3_PRODUCT CII_S2_BIOMASSandNH3_STOCK CII_S2_BIOMASSandNH3_ANALYZE CII_S2.2_BIOMASS_SEPARATE CIII_S2_NO3andWASTE_PRODUCT CIII_S2_NO3andWASTE_EVACUATE CIII_S2andE1_NO3andWASTE_PRODUCT CIII_S2andE1_NO3andWASTE_ACCEPT CIII_S2.2_WASTE_SEPARATE CIV_S2.2_BIOMASS_SEPARATE CIV_S2_BIOMASSandNO3_STOCK CIV_S2_BIOMASSandNO3_PRODUCT CIVHP_E2_H2OandNO3_ACCEPT CIVHP_S2.2_BIOMASS_EAT_STOCKED CIVHP_S2.1_BIOMASS_NEAT_STOCKED CIVHP_S2_BIOMASS_PRODUCT
- Control Flows supported :

6.5 Causality trees

6.5.1 Causality trees (functionnal and physical model)



6.5.2 Causality trees (functionnal model)