

User Requirements Specification Document for Pipelines

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Background and Context

This User Requirements Specification document specifies the requirements for the application "Pipelines in a flow network". To transport fuel from one place to another place pipelines are used. The system is becoming more complex over time therefore it becomes difficult to manage the flow of in the pipeline system. For safety purposes it is very important that the pressure in the pipes don't become too high. The following components are part of the flow system: pump, sink, splitter, adjustable splitter and merger.

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1 | Functional Requirements

1.1 Requirements

1.1.1 General requirements

Code	Requirement
GEN-010	The program is compatible with Windows 7.
GEN-020	The system allows to design a flow system using the following components: <ul style="list-style-type: none">• Pump• Sink• Splitter• Adjustable splitter• Merger
GEN-030	The system shows the flow through the pipelines.

1.1.2 System requirements

Code	Requirement
SYS-010	The system allows to add components to the flow network.
SYS-020	The components are not allowed to overlap each other.
SYS-030	The system allows to connect a pipeline between an unused output of a component to an unused input of a component.
SYS-040	The system allows to remove components including pipelines.
SYS-040A	All the pipelines connected to the removed component will also be removed.
SYS-050	The system allows to change the flow output of a pump within his range.
SYS-060	The system allows to change the distribution of the flow from splitter going to the top and bottom output.
SYS-070	The system displays the flow going through the pipelines.
SYS-070A	The system displays the pipeline red in case the flow exceeds the safety limit.
SYS-080	The system displays the flow transported to a sink.
SYS-090	The system allows to export the flow network to a file.
SYS-100	The system allows to import a flow network from a file.

1.2 Use cases

Use Case 1	Adding new component on flow network
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<i>Level:</i>	User-goal
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<i>Primary Actor:</i>	End-User
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<i>Preconditions:</i>	Component selected from toolbar
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<i>Main Success Scenario:</i>	
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1. User selects place on flow network grid
2. System places component on grid
3. System updates internal state

Extensions:

- 2.a System can't place component in selected area
 1. System informs end-user that component can't be placed, because on that point already exists component.
 2. End of use case
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Use Case 2 Changing flow output/input in pump/tank

Level: User-goal

Primary Actor: End-User

Preconditions: Selected pump/tank on flow network grid

Main Success Scenario:

1. User selects component on grid
 2. System opens property sidebar
 3. User input new output/input values in properties sidebar
 4. System updates values of component
 5. System updates internal state
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Extensions:

2.a System can't open property bar, because user selected wrong component

1. User returns to step 1.
2. End of use case

Use Case 3	Changing flow output in splitter component
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<i>Level:</i>	User-goal
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<i>Primary Actor:</i>	End-User
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<i>Preconditions:</i>	Selected pump/tank on flow network grid
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Main Success Scenario:

1. User selects component on grid
2. System opens property sidebar
3. User input new output values in properties sidebar
4. System updates values of component
5. System updates internal state

Extensions:

2.a System can't open property bar, because user selected wrong component

1. User returns to step 1.
 2. End of use case
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Use Case 4	Creating connection between components
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<i>Level:</i>	User-goal
<i>Primary Actor:</i>	End-User
<i>Preconditions:</i>	Selected pipeline drawing tool from toolbar
<i>Main Success Scenario:</i>	
<ol style="list-style-type: none"> 1. User selects starting component 2. User selects point on grid, through where pipeline will go 3. User repeats step 2, untill he has selected all points, through where pipeline will go 4. User selects ending component 5. Systems draws pipeline 6. System updates internal state 	
<i>Extensions:</i>	
<ol style="list-style-type: none"> 1.a Selected component already has no unused output <ol style="list-style-type: none"> 1. System informs end-user that the selected component can't be used. 2. User returns to step 1. 3. End of use case. 2.a Selected point on grid is occupied by component. <ol style="list-style-type: none"> 1. System ignores the selected point. 	
Use Case 5 Deleting element on flow network grid	
<i>Level:</i>	User-goal

Primary Actor: End-User

Preconditions: Selected tool for removing component

Main Success Scenario:

1. User selects component on pipeline network grid
 2. System removes selected component
 3. System removes pipelines connected to component, if component isn't pipeline
 4. System updates internal state
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Use Case 6 Changing current flow of a pump

Level: User-goal

Primary Actor: End-User

Preconditions: Selected pump

Main Success Scenario:

1. User inputs new flow
 2. System updates flow network grid.
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Extensions:

- 1.a The new flow exceeds capacity
 1. System informs end-user that the selected component can't be used and the maximum flow possible is used
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Use Case 7	Change output adjustable splitter
<i>Level:</i>	User-goal
<i>Primary Actor:</i>	End-User
<i>Preconditions:</i>	Selected adjustable splitter
<i>Main Success Scenario:</i>	
<ol style="list-style-type: none"> 1. User uses slider to adjust the output. 2. System updated the flow network grid. 	
<i>Extensions:</i>	
<ol style="list-style-type: none"> 1.a Component isn't adjustable splitter. <ol style="list-style-type: none"> 1. The option to adjust the flow isn't shown. 	
Use Case 8	Current flow
<i>Level:</i>	User-goal
<i>Primary Actor:</i>	End-User
<i>Preconditions:</i>	Pipeline connection
<i>Main Success Scenario:</i>	
<ol style="list-style-type: none"> 1. System displays current flow in pipeline. 	
Use Case 9	Load file
<i>Level:</i>	User-goal

Primary Actor: End-User

Preconditions: Saved file with pipeline network

Main Success Scenario:

1. User selects file to open.
 2. System closes previous project.
 3. System loads the file.
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Extensions:

2.a File can't be loaded.

1. System informs user that file can't be loaded and given the choice to stop or choose another file.
2. End of use case.

2.b Another project is open

1. System asks if users wants, to save project, that is already open, before closing it and opening another project.
 2. End of use case.
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Use Case 10 Save file

Level: User-goal

Primary Actor: End-User

Preconditions: Open pipeline network project

Main Success Scenario:

1. User presses save button.
 2. System saves the file.
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2 | User Interface

TODO

3 | Nonfunctional Requirements

Code	Requirement
NON-010	The program has an user friendly design.
NON-020	The software is made testable
NON-030	The program has good performance whereby the application is responsive.
NON-040	The program has good performance whereby the application is responsive.
NON-050	The program is always available when the user needs it.
NON-060	The program is maintainable.
NON-070	The program is efficient so the task can be done as quick as possible.
NON-080	The program is stable, the program doesn't show any errors.
NON-090	The program has a good user experience which means it is a pleasant working experience for the user.

3.1 Usability factors

Code	Requirement
USF-010	The application is designed to be used with a mouse.
USF-020	Buttons have appropriate sizes to avoid mis-clicks.
USF-030	The colours used for representing different meanings should have clear definitions.