Generating Process Engineering Deliverables with Aspen Basic Engineering™ (ABE)

Get Started with Aspen Basic Engineering

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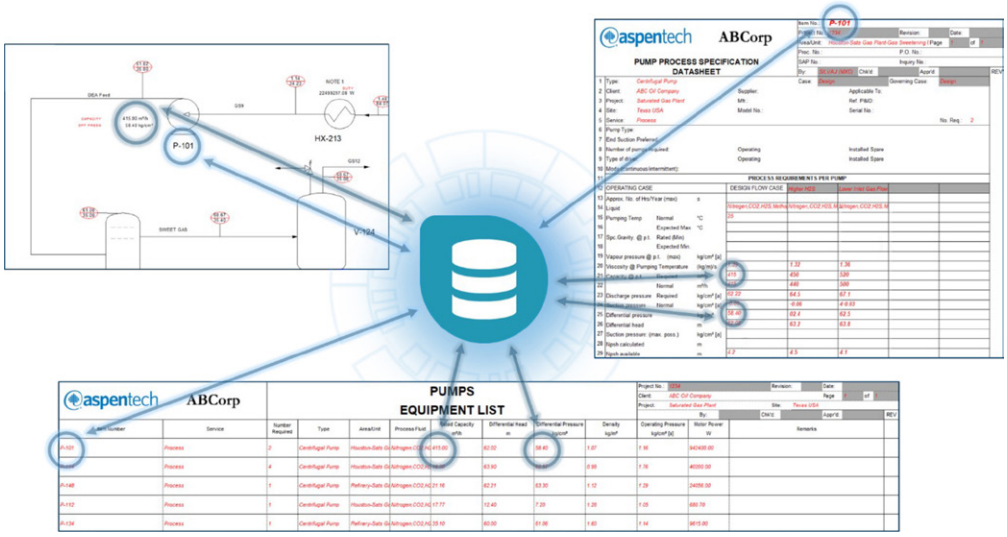
Aspen Basic Engineering Overview

Aspen Basic Engineering (ABE) is a client/server database application that enables multiple users to collaborate in a shared workspace, allowing them to manage data and create engineering deliverables for single or multiple projects. ABE facilitates the development and management of FEED deliverables, such as process flow diagrams (PFDs), equipment datasheets, equipment lists, and heat and material balances (HMBs).

ABE enables a "single source of truth" workflow, centralizing data from various sources and integrating the data seamlessly into these deliverables. Changes made by one user are instantly reflected across all other deliverables, with data managed under a strict change control process. User administration, calculation configuration, case comparison and revision control are some of the key features of Aspen Basic Engineering.



Process Engineering Deliverables

Aspen Basic Engineering provides out-of-the-box datasheets, equipment lists and symbols. This guide will help you get started using basic ABE functionality to create process engineering deliverables.

ABE offers two deployment options:

- **ABE Enterprise** enables multiple users to connect to a single, centralized workspace. A server is required to install ABE Enterprise and individual users must install ABE applications on their local machines to connect to the server on which ABE was deployed.
- **ABE Local** enables individual users to connect to their own workspace. This is recommended for small projects and/or if users wish to generate Safety (PSV) datasheets. Installation of the ABE local server is required.

The data in each document is linked to the database where it is stored. ABE Local has a SQL local DB, while ABE Enterprise supports SQL, Azure SQL and Oracle databases. This ensures that data is updated in one document automatically updates across all related documents. All changes are managed according to user permissions for secure, controlled access.

Installation resources can be found on the AspenTech Support site:

- Installation Guide: AspenTech: Knowledge Base 100368
- Installation Video: AspenTech: Knowledge Base 99840
- Installation eLearning: AspenTech: Knowledge Base 101246

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Importing Data from Process Simulators

As previously mentioned, Aspen Basic Engineering can generate deliverables for process engineering. To simplify and expedite this process, ABE imports data directly from process simulators such as Aspen HYSYS® and Aspen Plus®, which eliminates the need for manual data entry, reduces the risk of typing errors and saves valuable time.

Overview

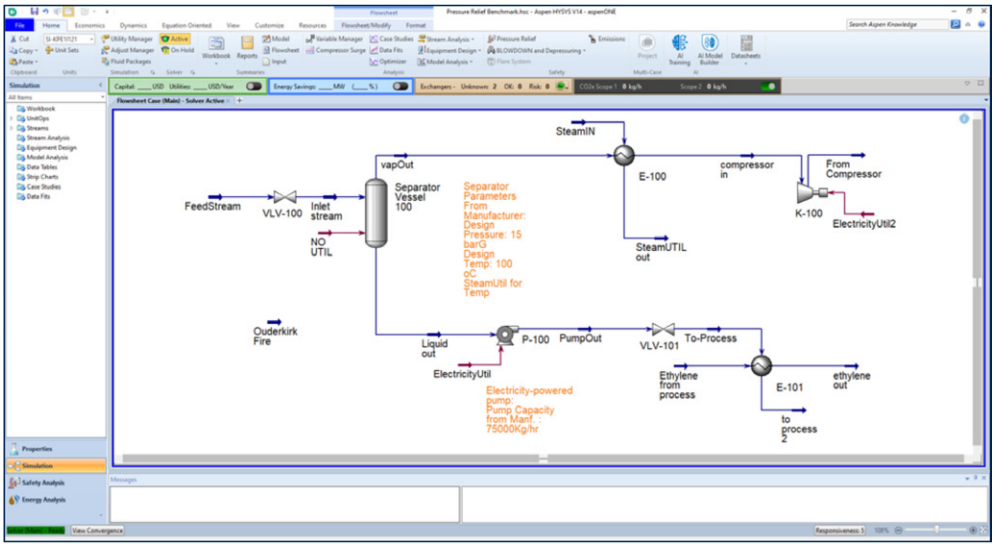
This guide reviews how to transfer data from a process simulation into ABE's database, including the steps needed to create or connect to an ABE workspace, how to map unit operations to equipment, manage material ports and handle case management.

ABE can be launched directly within the Aspen HYSYS and Aspen Plus interfaces. See **Tasks 1** and **2A** instructions below. Two starter files are provided, depending on your simulator preference. Use the file with the .APWZ extension to work with Aspen Plus or the file with the .HSC extension for Aspen HYSYS.

link: https://esupport.aspentech.com/S_Article?id=000104408

Task 1 – Import Data from Simulation

1. Open the attached file **Pressure Relief Benchmark**. This file contains a simulation of various unit operation types and to illustrate how each of them can be mapped into ABE.



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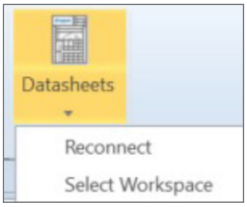
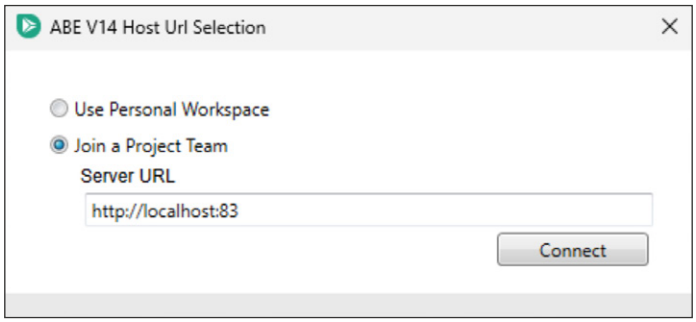
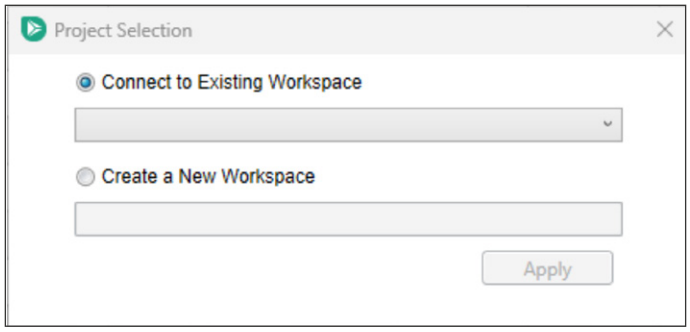
2. Locate the **Datasheets** button in the **Home** ribbon tab and click on **Select Workspace**.

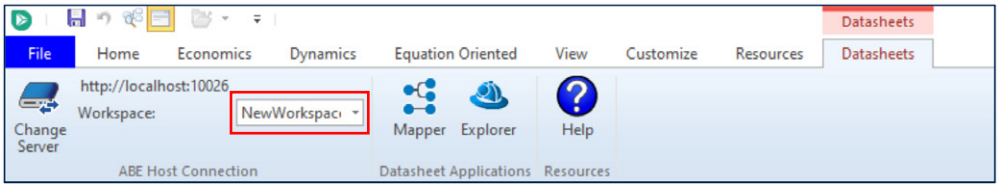


3. For **ABE Local**, select **Use Personal Workspace**. For **ABE Enterprise**, select **Join a Project Team** and add the Server URL where ABE Enterprise is installed.



4. For **ABE Local** mode, select **Create a New Workspace** and enter a name for said workspace. For **ABE Enterprise**, your administrator should create a workspace to be displayed in the **Connect to Existing Workspace** dropdown list. Click **Apply**.





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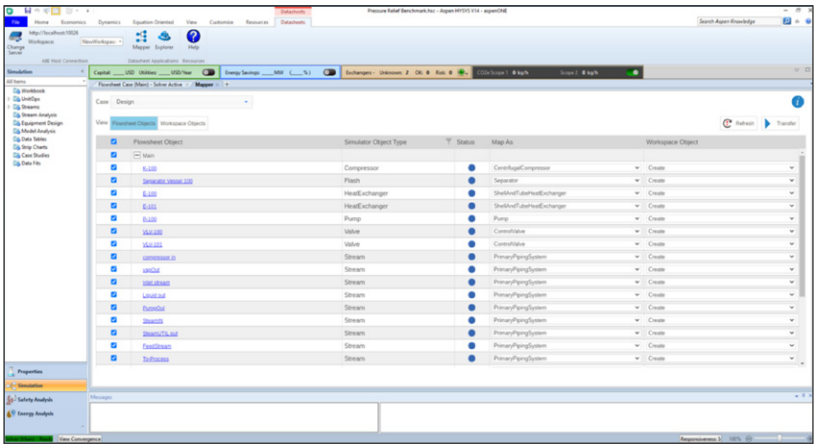
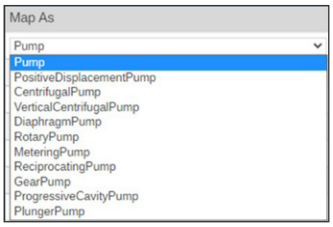
5. Wait for the connection to be complete. A new **Datasheets** ribbon tab will appear, showing functionality integrated within the process simulator. This tab shows the name of the currently connected workspace and provides access to the **Mapper** and **Explorer** modules.

   Once connected to a workspace, the **Mapper** module will open by default. This module reads the simulation file, listing all unit operations and streams that can be transferred to ABE.



Users can select which operations and streams to import into ABE. The system automatically suggests a suitable ABE equipment type for each unit operation but also provides the flexibility to change the mapping to a different equipment type. The **Map As** dropdown menu displays the available equipment classes in ABE that can be assigned based on the unit operation.



ABE can store data from multiple cases, which can come from different simulation files or from the same simulation file transferred multiple times after modifications. **Design** is the default case created for all ABE Workspaces. Create as many additional cases as needed. For detailed instructions, refer to the **Help** section.

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6. For this example, leave the default mapping and case settings. Click on the **Transfer** button to import data into ABE's workspace.

At this point, the stream and unit operation data available in the simulation file has been successfully transferred to ABE and can be accessed even outside the process simulators.

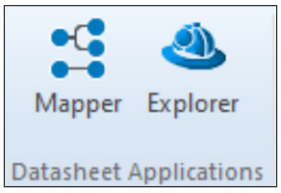
Generating Datasheets

Overview

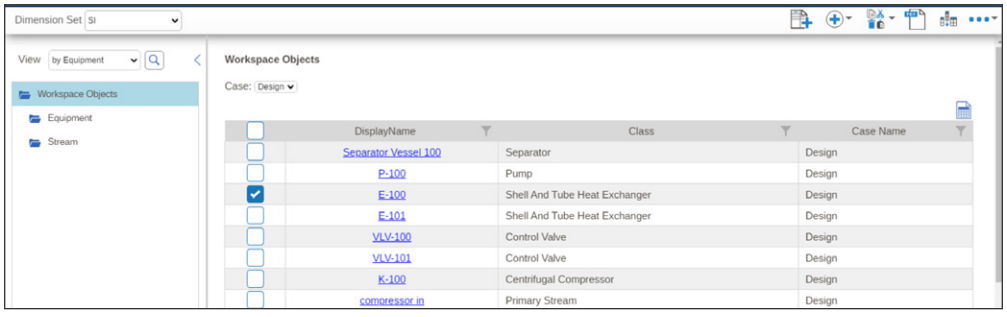
With simulation results are available in ABE's workspace, you can start creating engineering deliverables such as equipment datasheets and equipment lists. In this section you'll explore how these can be generated within the process simulator interface via ABE Web **(Task 2A)** or how these deliverables can be created in ABE's Desktop application **(Task 2B)**.

Task 2A – Generate Datasheets/Equipment Lists in ABE Web

7. Click the **Explorer** button to open a new tab that displays the objects (equipment and streams) and deliverables in the ABE workspace.



8. Find and select the Shell and Tube Heat Exchanger **E-100**, then click on **Add New Datasheet**.



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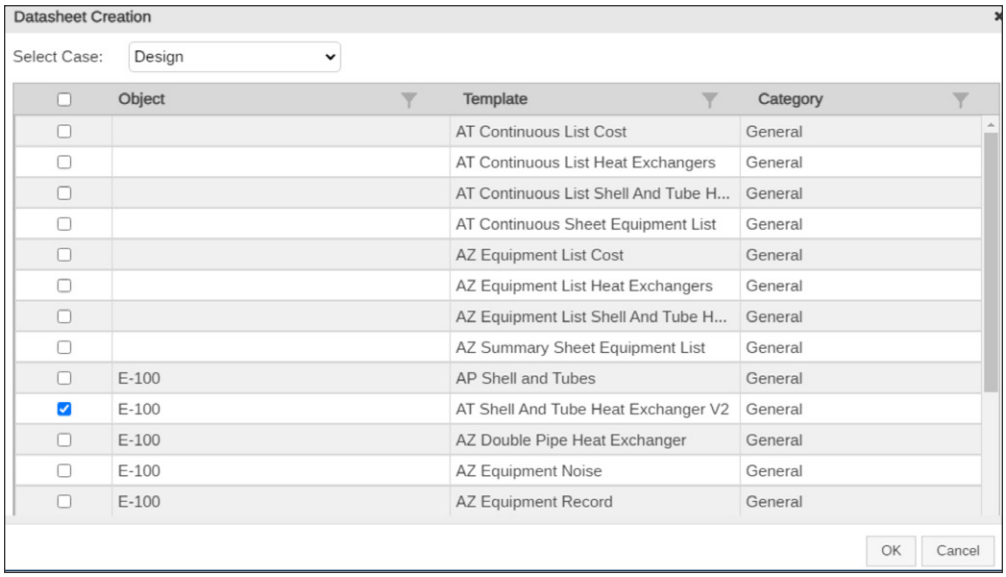
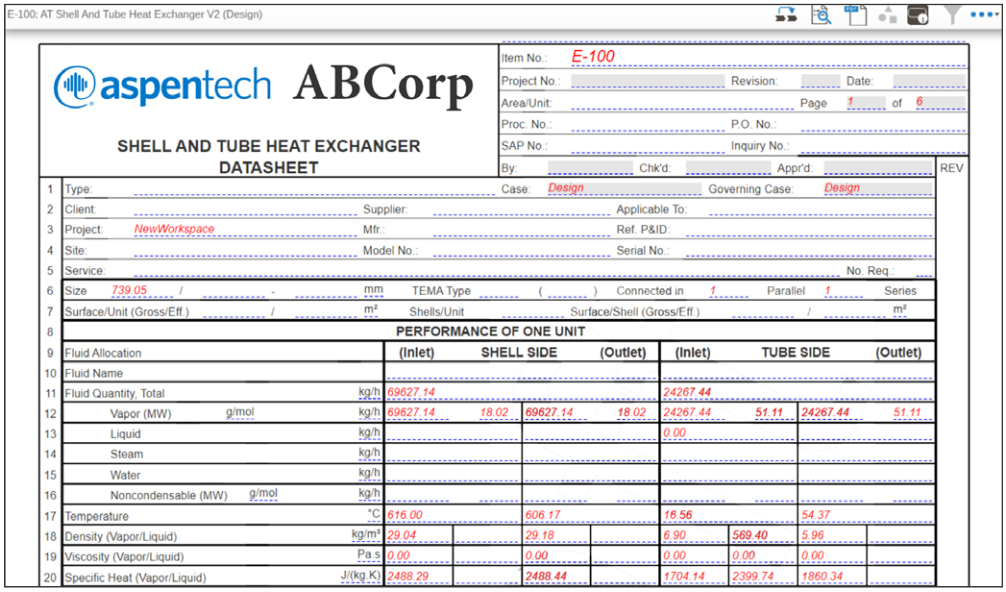
9. A list of available datasheets and equipment list templates for the equipment displays. Select **AT Shell and Tube Heat Exchanger V2** and click **OK**.



10. Scroll through the datasheet and check the different tabs to review the populated information. This Out-of-the-box datasheet template is a TEMA-style document that displays the process simulation data for exchanger **E-100,** transferred to ABE's design case, highlighted in red.

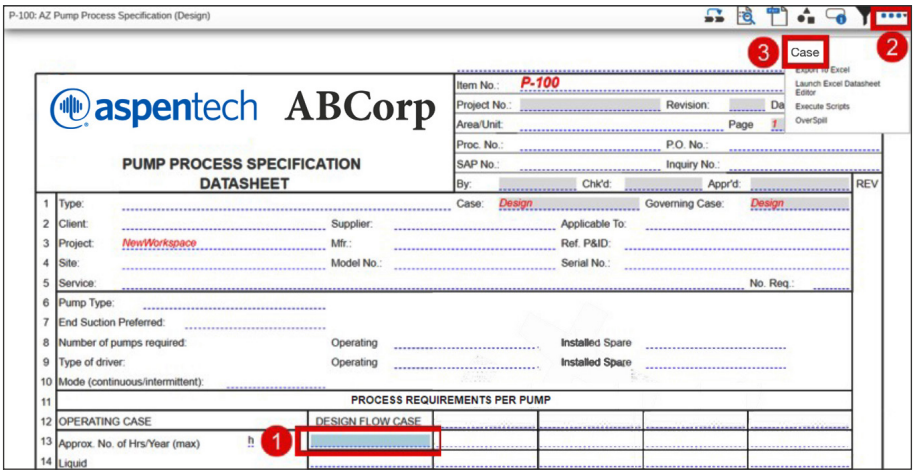


NOTES

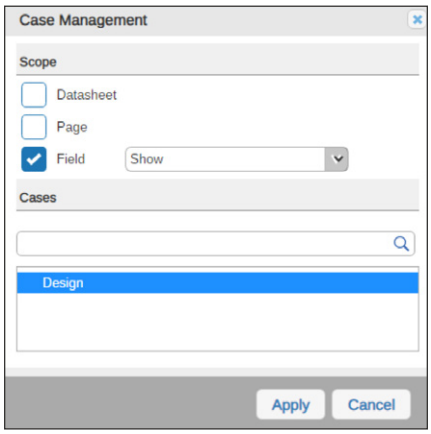
11. Go back to the **Explorer** tab, which typically refreshes to include the newly created documents. Switch back to **by Equipment** option in the **View** menu.

12. Repeat the steps to create the **AZ Pump Process Specification** datasheet for pump **P-100**.

13. Once the datasheet is generated, highlight the first cell below **DESIGN FLOW CASE** (row 13), then click on the three dots (**...**) icon on the top right and **Case**.



14. The **Case Management** window displays. Fill in the case information for the selected column in the datasheet. Check the **Field** option and confirm the option **Show** is selected on the dropdown list next to it. Finally, indicate the case to display (Design).



15. Click **Apply**. Return to the datasheet and confirm the DESIGN FLOW CASE column is filled. This datasheet lets users display the data from multiple case on the same page.

NOTES

12	OPERATING CASE			DESIGN FLOW CASE		
13	Approx. No. of Hrs/Year (max)		h			
14	Liquid			Propane,n-Butane		
15	Pumping Temp	Normal	°C	16.56		
16		Expected Max	°C			
17	Spc.Gravity. @ p.t.	Rated (Min)				
18		Expected Min.				
19	Vapour pressure @ p.t.	(max)	MPa[a]			
20	Viscosity @ Pumping Temperature		Pa.s	0.16		
21	Capacity @ p.t.	Required	m³/h			
22		Normal	m³/h	87.81		
23	Discharge pressure	Required	MPa[a]	0.60		
24	Suction pressure	Normal	MPa[a]	0.30		
25	Differential pressure		MPa	0.30		
26	Differential head		m	5.48		
27	Suction pressure: (max. poss.)		MPa[a]			
28	Npsh calculated		m			

16. Create an equipment list for the heat exchangers present in the simulation. Go back to **Explorer** and select any Shell and Tube Heat Exchanger. Next, select **AT Continuous List Shell and Tube Heat Exchangers**.

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CONTINUOUS LIST
SHELL AND TUBE HEAT EXCHANGERS

Item Number	Service	PV Number / PFD Number	Eff. Area m² / Shell Diam. m	Tube Outside Diam. mm / Tube Length m	Shell Side MAWP / Tube Side MAWP MPa[g] @ °C	Shell Tracing / Ends Tracing	Shell Covering / Ends Covering	Shell Material / Tube Material
E-100			0.74	20.00 / 6.00	@ / @			0
E-101			0.74	20.00 / 6.00	@ / @			0
					@ / @			

Datasheets and Equipment Lists templates can be configured and customized by users. ABE includes the following functionality:

- Automatic conversion of units of measure
- Change unit of measure or unit set
- Revision workflow (submit, check, issue)
- Revision markup
- Case management
- Save to excel
- Filter and sort
- Execute scripts
- Print to PDF

More information can be found in **eLearning**, ABE Administrator Guide and in-product **Help**.

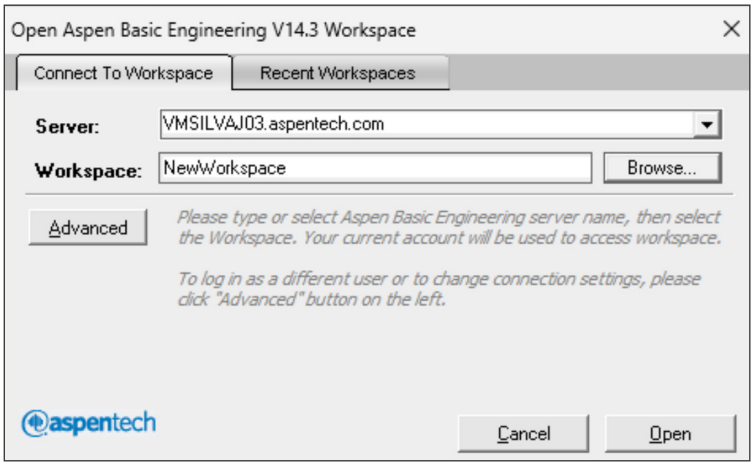
NOTES

Task 2B – Generate Datasheets/Equipment Lists in ABE Desktop

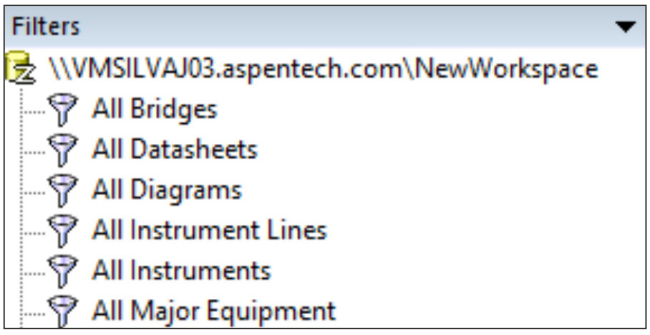
In this task, learn how to generate datasheets and equipment lists similar to those created in **Task 2A**. Follow this workflow to use the standalone ABE applications in the desktop version instead of the process simulator interface. ABE Desktop applications deliver full functionality to create process engineering deliverables.

7. From the **Windows Start** menu, open **Explorer - ABE** under **Aspen Basic Engineering**.

8. In the **Connect to Workspace** tab, **browse** for the same workspace that was created or used in Task 1.



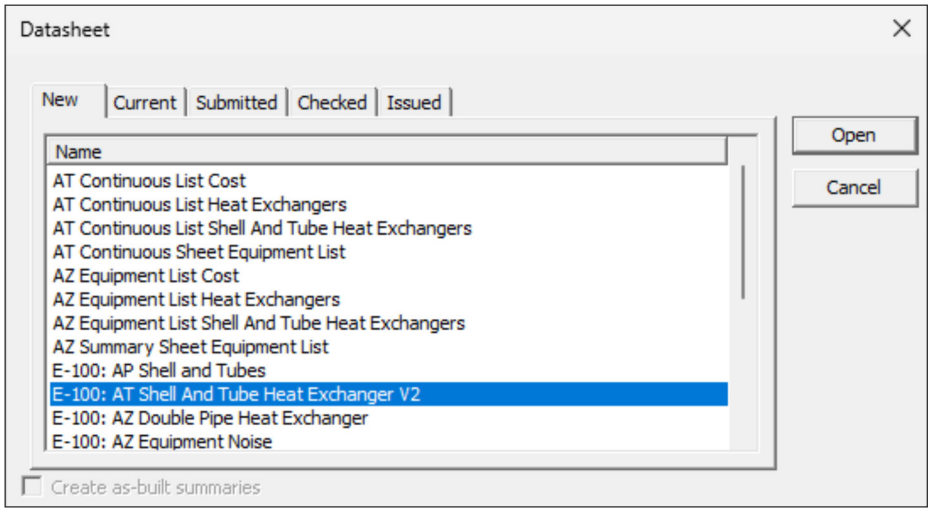
9. Once the workspace has loaded, review the **Filters** panel on the left.



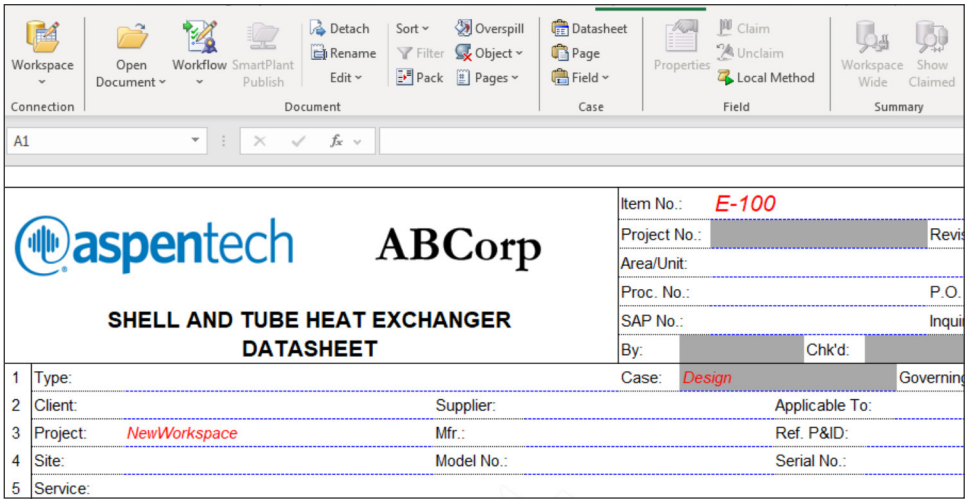
Use the **All Datasheets** filter to find the datasheets or equipment lists created in Task 2A. Available datasheets can be opened with **Excel Datasheet Editor** by double-clicking on them.

NOTES

10. Create a Datasheet for **E-100.** To create a new datasheet in **ABE Desktop Explorer**, click the **All Major Equipment** filter, find the Shell and Tube Heat Exchanger **E-100**, right-click and select **Datasheet**. Select **AT Shell and Tube Heat Exchanger V2** and click **Open**.



11. **Excel Datasheet Editor** opens. Click the tab **Aspen Datasheet**, to review the available actions.



12. Repeat the steps to generate the datasheet **AZ Pump Process Specification** for pump **P-100**.

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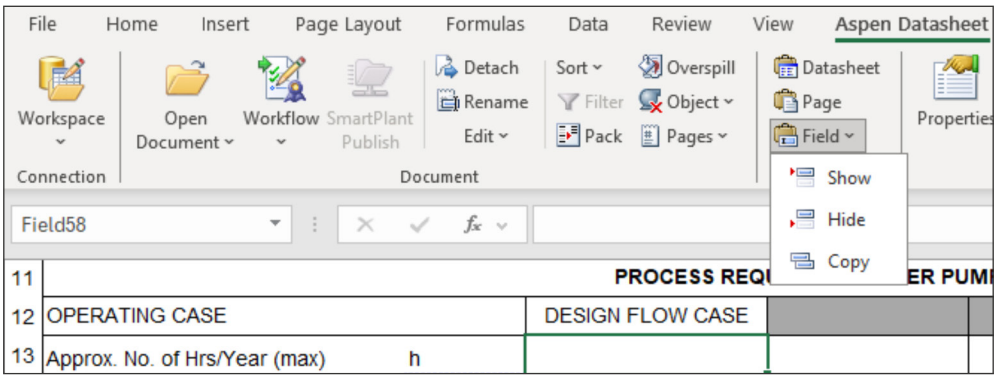
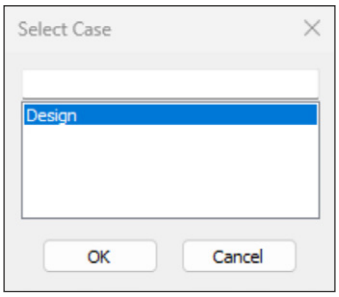
13. Click the cell below **DESIGN FLOW CASE** (row 13). Use the **Aspen Datasheet** ribbon to click on **Field** and **Show**.



14. Select the **Design** case, containing the information that will be displayed in the datasheet. Click **OK**.



15. Review the **DESIGN FLOW CASE** column. It should contain the chosen **Design** case data. This datasheet can display multiple case data on the same page.

11	PROCESS REQUIREMENTS PER PUMP					
12	OPERATING CASE			DESIGN FLOW CASE		
13	Approx. No. of Hrs/Year (max)		h			
14	Liquid			*Propane,n-Butane*		
15	Pumping Temp	Normal	°C	*16.56*		
16		Expected Max	°C			
17	Spc.Gravity. @ p.t.	Rated (Min)				
18		Expected Min.				
19	Vapour pressure @ p.t.	(max)	MPa[a]			
20	Viscosity @ Pumping Temperature		Pa.s	*0.16*		
21	Capacity @ p.t.	Required	m³/h			
22		Normal	m³/h	*87.81*		
23	Discharge pressure	Required	MPa[a]	*0.60*		
24	Suction pressure	Normal	MPa[a]	*0.30*		
25	Differential pressure		MPa	*0.30*		

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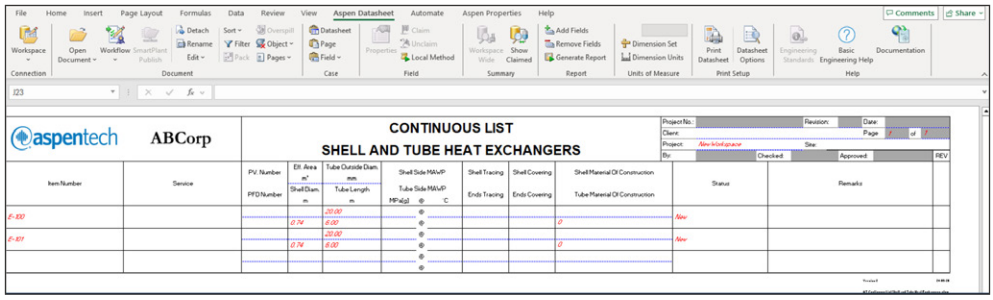
16. Create an Equipment List in **ABE Desktop Explorer** for the heat exchangers. Select any shell and tube heat exchanger and **AT Continuous List Shell and Tube Heat Exchangers**.



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Creating Process Flow Diagrams

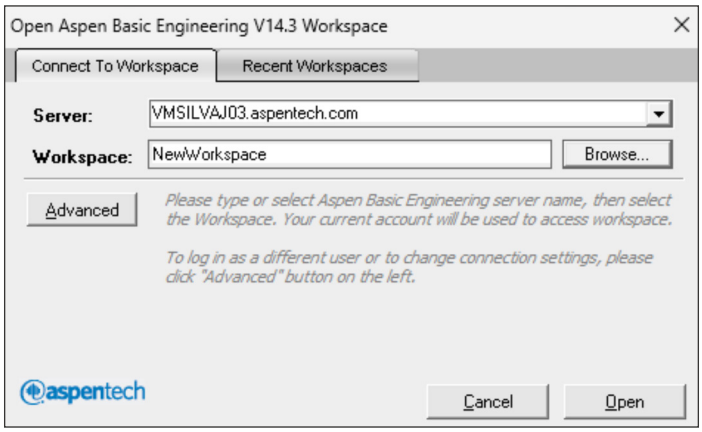
Overview

In this section, you'll explore the basic features of **Drawing Editor**, available in the ABE Desktop applications. Drawing Editor enables users to create smart Process Flow Diagrams (PFDs). Equipment and Streams imported from the process simulation can be used to generate the PFD. These objects are graphical representations that include all the imported data, meaning any label attached to them will display the information now stored in ABE's database.

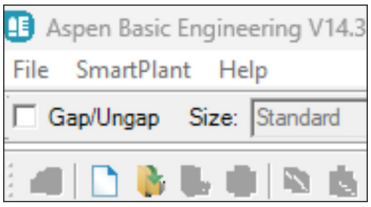
Task 3 – Generate Process Flow Diagrams

17. From the Windows Start Menu, open **Drawing Editor - ABE** under **Aspen Basic Engineering**.

18. In the **Connect to Workspace** tab, browse for the previously created workspace.



19. In the toolbar, click on **New Document**.



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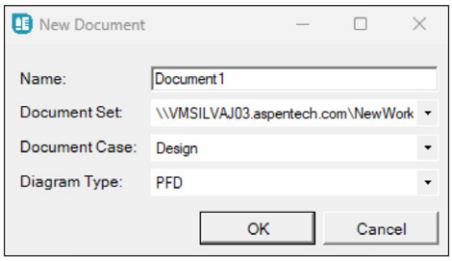
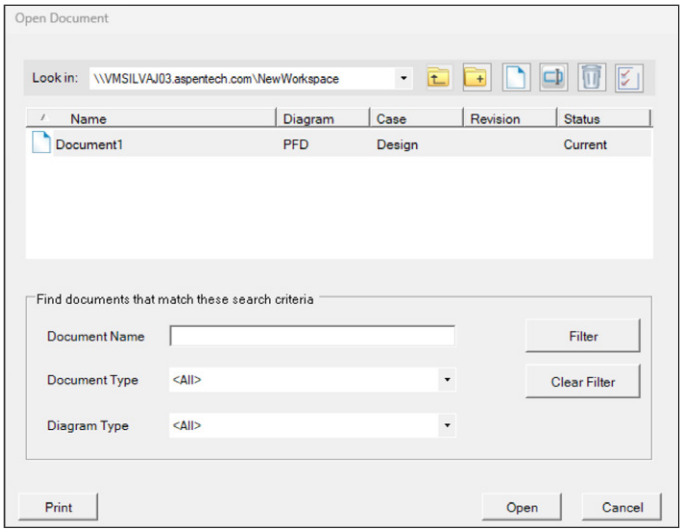
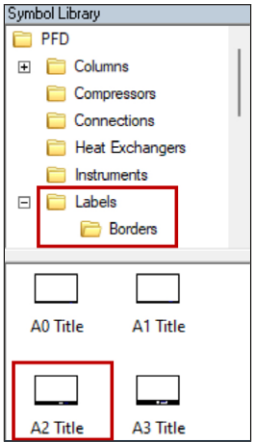
20. Add a name to the document and click **OK**.



21. In the **Open Document** window, select the created document and click **Open**.



22. Set the border for the drawing. Once the PFD opens, click on the **Labels** folder and then **Borders**. Click on **A2 Title** and click again on the bottom-left corner of the document to add it and resize the sheet. Press **ESC** once it is placed.



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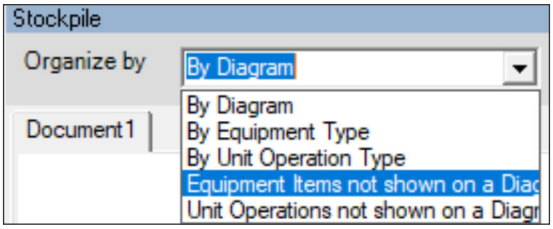
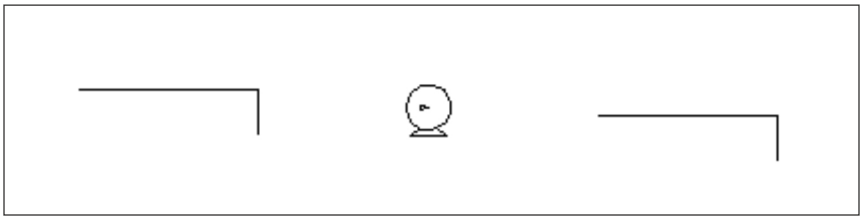
23. Select **Equipment Items not shown on a Diagram** in the **Stockpile** section on the bottom panel. This will show the imported Equipment and Streams from the simulation that have not been placed in the PFD.

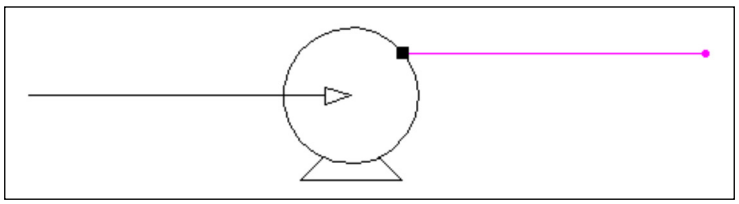


24. Enable the **Auto-Refesh** option in the **Stockpile**.

25. Drag and drop pump **P-100,** as well as streams **Liquid out** and **PumpOut** into the diagram.



26. Select the stream **Liquid out** and drag it to the pump icon to establish an inlet connection. Note that the pump has both inlet and outlet ports; a black square at the connection point indicates a successful link. Repeat the process and connect the stream **PumpOut** to the outlet port.



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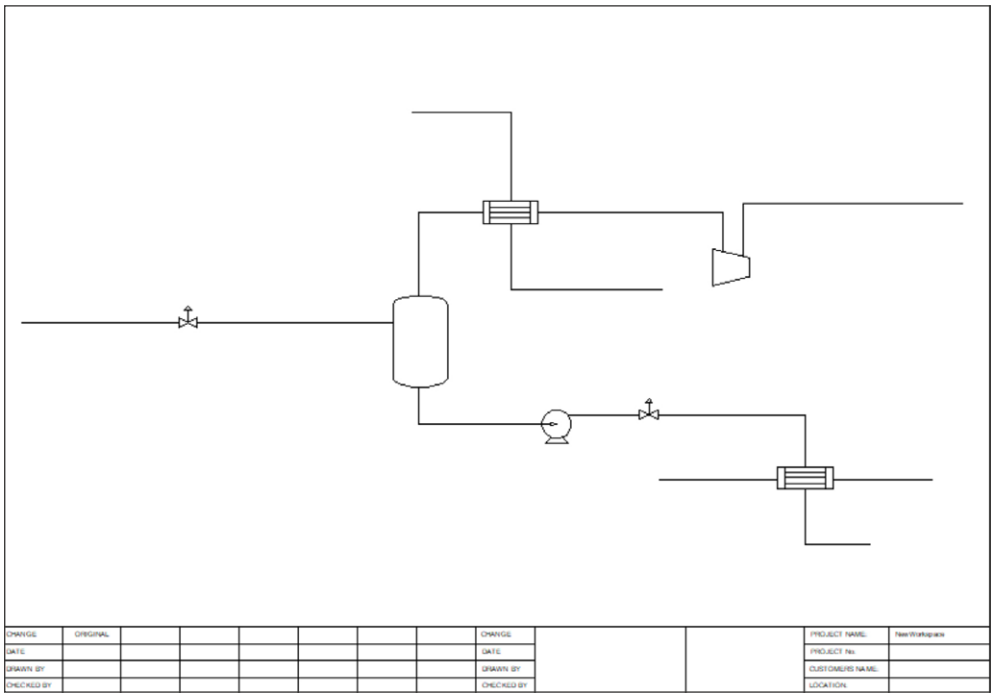
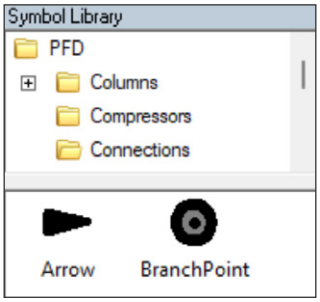
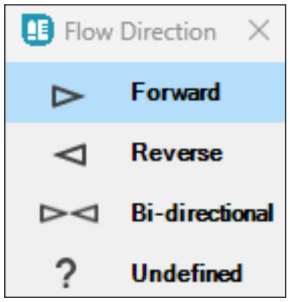
27. Repeat the same procedure with the rest of Equipment and Streams to complete the PFD as shown below, this matches the flowsheet we had in the process simulator.



The Drawing Editor includes zoom, move, select, pan, drag & drop, grid view, and grid snap functionality. Detailed information is located in the **Help Menu**.

28. Click on the **Symbol Library** and select the **Arrow** symbol to indicate the direction of the streams. When added to a stream, the arrow prompt specifies the fluid's direction—forward, reverse, bi-directional or undefined.





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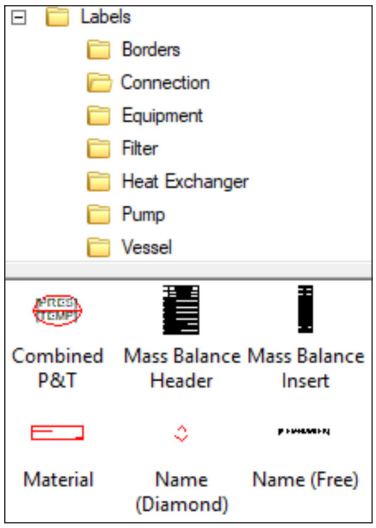
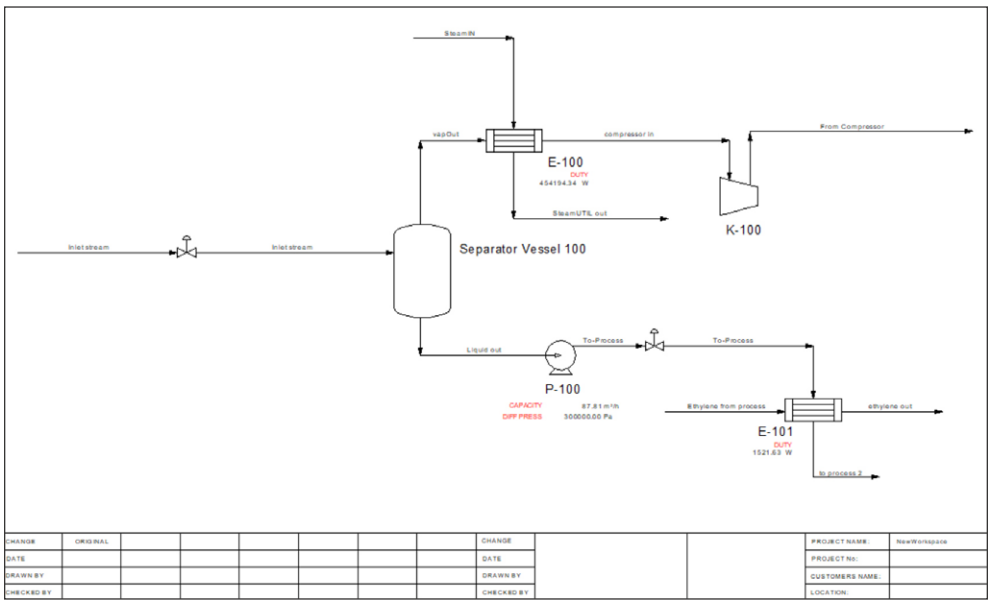
29. To finalize the PFD, add smart labels for the streams and equipment. In the **Symbol Library**, select **Labels | Connection**. Choose **Name (Free)** and add it to every stream. Position the labels and select the corresponding stream to associate them with.



30. Go to **Labels | Equipment** to add smart labels for equipment. Use the **Name (5mm)** label. There are specific labels for **Heat Exchangers** and **Pumps** in the corresponding folders that can be added to the PFD. Labels will automatically display data from the transferred simulation data now stored in the ABE database.



Additional labels and symbols can be configured in ABE. ABE includes the following functionality for PFDs in Drawing Editor:

- Automatic conversion of units of measurem
- Change unit of measure or unit set
- Heat and material balance table
- Revision workflow (submit, check, issue)
- Revision markup
- Case management
- Import/Export DWG, DGN and DXF files
- Shared diagrams (MSD, DPDT, PSD)
- Execute scripts
- Print to PDF

More information can be found in **eLearning**, ABE Administrator Guide and in-product **Help.**

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Conclusion

Aspen Basic Engineering empowers Process Engineers to efficiently create smart deliverables like datasheets, equipment lists and process flow diagrams, saving both time and resources. ABE shifts companies from a document-centric to a data-centric workflow, serving as a centralized repository that promotes data integration, consistency, and up-to-date deliverables. The key benefits of ABE include:

- Seamless integration with AspenTech's process simulation, cost estimation and equipment design solutions
- Data-driven documents with full revision control for datasheets, diagrams and equipment lists
- Shared information repository where updates are instantly reflected across all deliverables
- Centralized management of design cases and units of measurement (UOM)
- Standardization of deliverables, workflows and engineering best practices
- A unified project database housing all process data, cases and topology
- Reusable design templates to streamline future projects
- Ability to capture and enforce design rules
- Integration with third-party tools such as PROII, HTRI, Excel and Smart P&ID

For a comprehensive overview of Aspen Basic Engineering's capabilities, view the webinar:
Accelerate Projects with Data-Centric Engineering

To learn more about Safety Datasheets within the process simulators, watch the video:
Demonstration Video: Process Safety

For more information on integration between ABE and SP&ID, watch the video:
Seamless Data Flow from Simulation to Aspen Basic Engineering and Smart P&ID

About Aspen Technology

Aspen Technology, now part of Emerson, is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle Through our unique combination of deep domain expertise and innovation, customers in asset-intensive industries can run their assets safer, greener, longer and faster to improve their operational excellence.

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