A tutorial guide in linking Aspen Plus Dynamics with Matlab Simulink

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Introduction

The purpose of this guide is to help users to link Aspen Dynamic with Matlab Simulink;

> *"Aspen Plus Dynamics is Aspentech easy-to-use dynamic modeling tool for plant operations and process design. It enables users to study and understand the dynamics of real plant operations, thereby achieving increased operability, safety and productivity."*
>
> *"Simulink® is a block diagram environment for multidomain simulation and Model-Based Design. It supports system-level design, simulation, automatic code generation, and continuous test and verification of embedded systems. Simulink provides a graphical editor, customizable block libraries, and solvers for modeling and simulating dynamic systems. It is integrated with MATLAB®, enabling you to incorporate MATLAB algorithms into models and export simulation results to MATLAB for further analysis."*

Thus by combining both software, users able to develop/simulate complex chemical processes inside Aspen Plus Dynamics and further analyzed them in terms of sensitivity, control, optimization, safety and operability using Matlab Simulink.

Compatibility issue

Please note that MATLAB uses 64-bit in releases starting with R2016 and Aspen Plus Dynamics only uses 64-bit starting with V11. As a result, Aspen Plus Dynamics prior to V11 will not work with MATLAB R2016 and above. Thus, for Aspen Plus Dynamics V10 and earlier, the latest version that can work is MATLAB R2015b.

Step by step guide

This tutorial procedure is created based on the author experience (I am using Aspen Plus V11 and Matlab R2017b). Thus, there are maybe better ways to performed it.

1. Open the Matlab software
2. Change the current folder to **AMSystem V11.0** using the address field (C:\Program Files\AspenTech\AMSystem V11.0\Bin)
3. Find and open **AMSimulink.mdl** file inside folder. Copy the **AMSimulation** block (refer Figure 1) to another blank Simulink model environment.

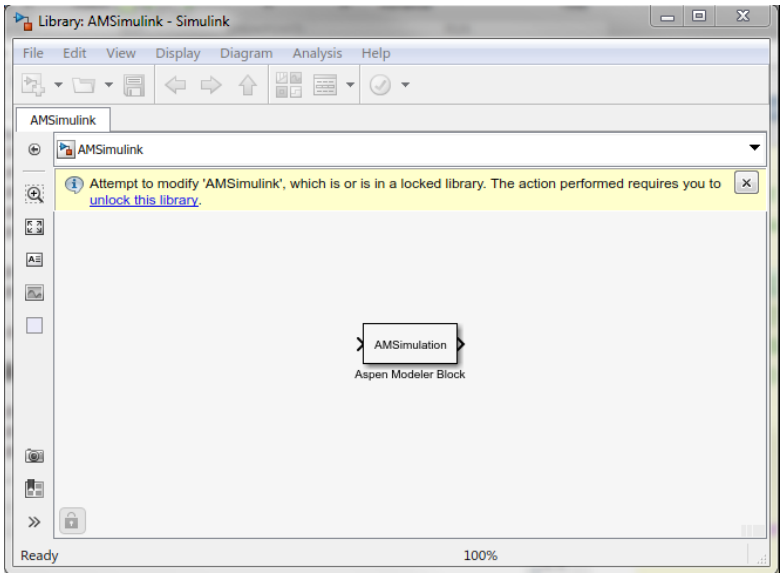

Figure 1

4. After copying the file, double click the block. A menu for Aspen Modeler Input file will popup and browse for the targeted Aspen Dynamic file (refer Figure 2). Select the Aspen Dynamic model file and click open. Here, I am using the Aspen Dynamics model from my research work [1].

[1] Muhammad, D., Z. Ahmad, and N. Aziz, *Low density polyethylene tubular reactor control using state space model predictive control.* Chemical Engineering Communications, 2019: p. 1-17.

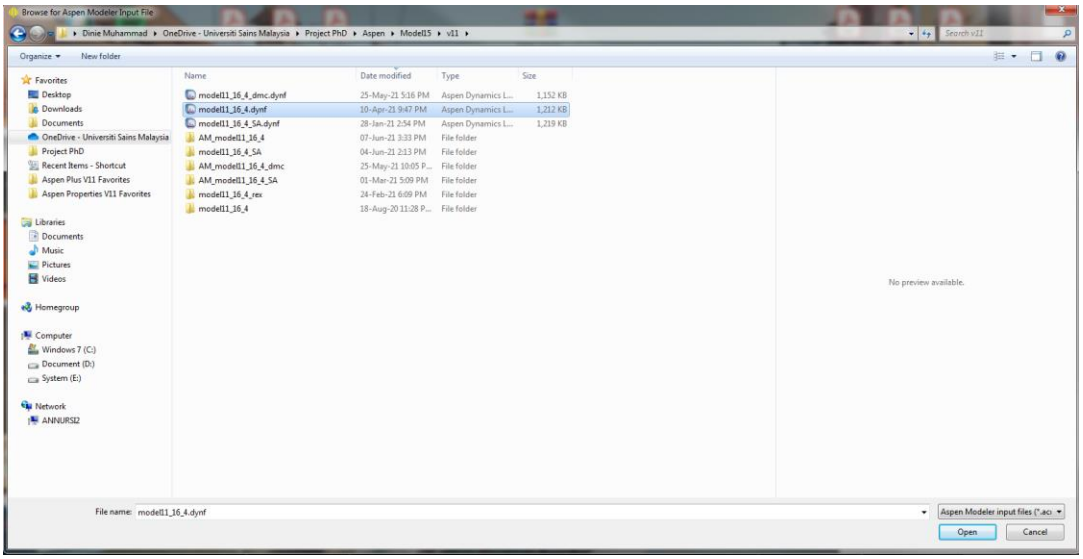

Figure 2

5. This action should opened up the Aspen Dynamics model and AMSimulation block menu (refer Figure 3). In the author's experience, untick the "Only show Input/Output variables on the browse lists". This will make all the available variables in the Aspen Dynamics model will appeared in the list.

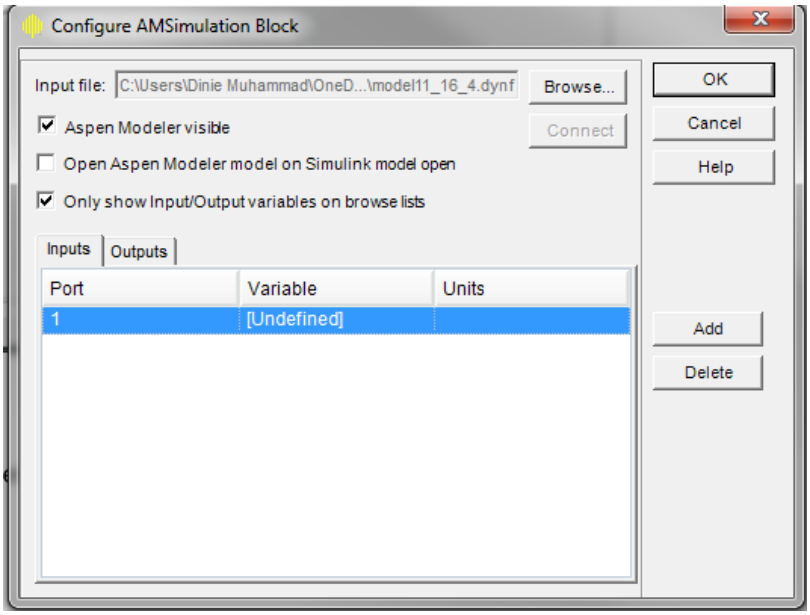

Figure 3

6. Click the **Variable column** in the configure menu and select the desired variables (from a list of variables) as the Model Input. Click **Add button** to add another input. Switch to the next tab to

select the variables as the Model Output. The **Port column** represents the number of Input/Output that have been selected. Click **OK button** after finished selecting the model inputs and outputs. *for control study, Input represents the manipulated variable (MV) or controller output (CO), while Output represent the control variable (CV) or process variable (CV).

7. By right the number of AMSimulation block input/output port will equivalent to the number of inputs/outputs that had been selected in the configuration menu. In this example, I am simulating a single input and single output process. A step change is introduced to the process and the output result is observed from the Scope block. After finished arrange the related block, click **Run** button in the Simulink to start the simulation.

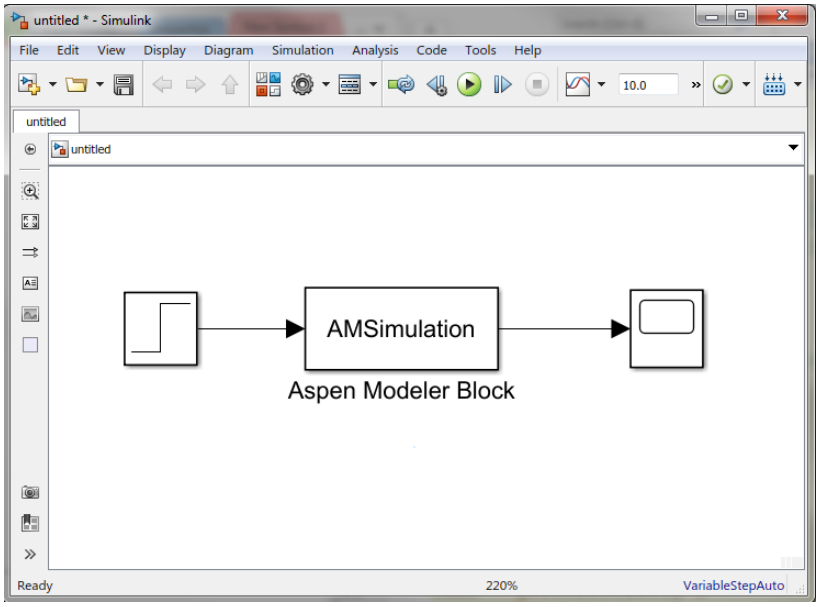

Figure 4

8. By right, both of the software will run simultaneously as shown in Figure 5. Based on the figure, the Step change input is entering the AMSimulation block (represent the Aspen Dynamics model), which has resulted the output temperature to drop. This conclude the tutorial.

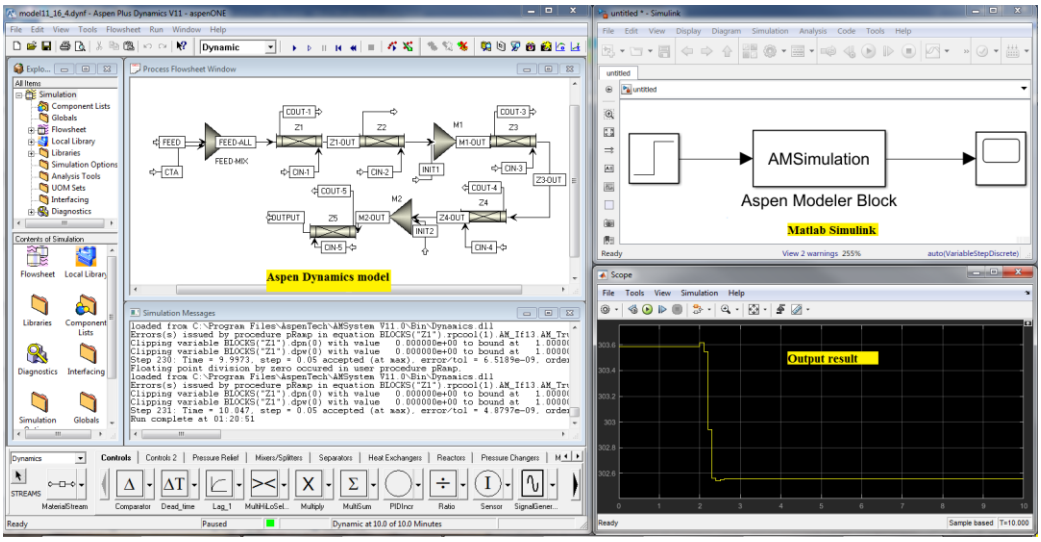

Figure 5

Additional notes

1. Based on my experience, I would recommend to run these programs (as administrator); am_task_server.exe and sim_server.exe inside the Aspen Plus installation folder (C:\Program Files\AspenTech\AMSystem V11.0\Bin) before the linking process.
2. If there are some problems during the linking, running the AMFixUtility.exe inside the same folder. It probably can help. If not, try to reopen the both software and or restart the computer.

About the author

I am currently a postgraduate student in Universiti Sains Malaysia studying in advanced process control. My interests are in process control, process modeling and machine learning. My email is annursi@gmail.com.