



# IBIS Simulation

USER GUIDE

# Launching the app

Before launching, ensure that the following programs are installed:

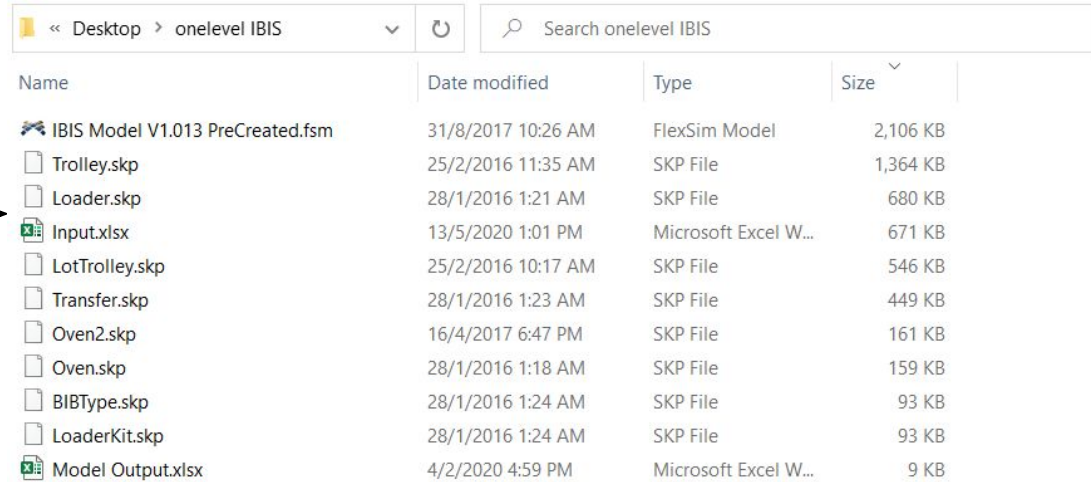
- FlexSim 7.3
- Microsoft Excel
- Tableau Desktop

Ensure that these files are present:

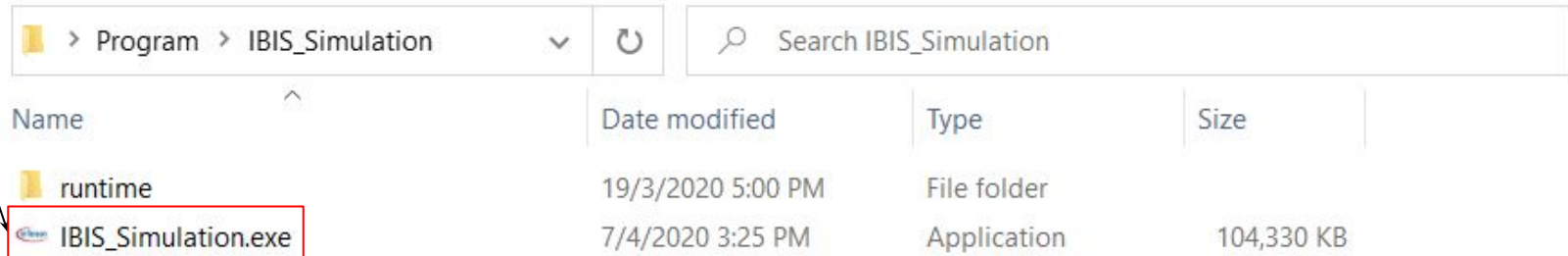
- All FlexSim simulation model files
- **Input** Excel file (.xlsx) with data
- Blank **Output** Excel file (.xlsx)

The Excel files can be placed anywhere to define the location for generated files.

Double-click **IBIS\_Simulation.exe** to launch!



Name	Date modified	Type	Size
IBIS Model V1.013 PreCreated.fsm	31/8/2017 10:26 AM	FlexSim Model	2,106 KB
Trolley.skp	25/2/2016 11:35 AM	SKP File	1,364 KB
Loader.skp	28/1/2016 1:21 AM	SKP File	680 KB
Input.xlsx	13/5/2020 1:01 PM	Microsoft Excel W...	671 KB
LotTrolley.skp	25/2/2016 10:17 AM	SKP File	546 KB
Transfer.skp	28/1/2016 1:23 AM	SKP File	449 KB
Oven2.skp	16/4/2017 6:47 PM	SKP File	161 KB
Oven.skp	28/1/2016 1:18 AM	SKP File	159 KB
BIBType.skp	28/1/2016 1:24 AM	SKP File	93 KB
LoaderKit.skp	28/1/2016 1:24 AM	SKP File	93 KB
Model Output.xlsx	4/2/2020 4:59 PM	Microsoft Excel W...	9 KB



Name	Date modified	Type	Size
runtime	19/3/2020 5:00 PM	File folder	
IBIS_Simulation.exe	7/4/2020 3:25 PM	Application	104,330 KB

# App UI

The app will run all combinations of lot sequencing rules and BIB batch sizes as defined.

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

**Lot Dispatch**

Choose the lot sequencing rule(s) for the simulation to run. Please select at least one. "First-Come-First-Served" keeps the sequence supplied in Actual Lot Info.

Lot Sequencing Rule(s) to Run: ☒ First-Come-First-Served (Default) ☐ Shortest Processing Time ☐ Most Jobs ☐ Random

**BIB Batch Size**

Choose the allowable minimum BIB batch size to run. A range can be run incrementally based on the step size. Maximum BIB batch size for every run is fixed at 24.

Select the desired lot sequencing rule(s) to run, on lots supplied in 'Actual Lot Info' sheet of Input Excel. Ensure that the lots supplied are in **ascending order of 'Period (Week#)'**!

- **First-Come-First-Served (FCFS):** Keeps sequence supplied
- **Shortest Processing Time (SPT):** Sorts in ascending order of processing time\* (per period)
- **Most Jobs (MJ):** Sorts in descending order of lot size (per period)
- **Random (RAND):** Randomises sequence (per period)

\*As defined in 'Process Time' sheet of Input Excel

# App UI

The app will run all combinations of lot sequencing rules and BIB batch sizes as defined.

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

**Lot Dispatch**

Choose the lot sequencing rule(s) for the simulation to run. Please select at least one. "First-Come-First-Served" keeps the sequence supplied in Actual Lot Info.

Lot Sequencing Rule(s) to Run: ☒ First-Come-First-Served (Default) ☐ Shortest Processing Time ☐ Most Jobs ☐ Random

**BIB Batch Size**

Choose the allowable minimum BIB batch size to run. A range can be run incrementally based on the step size. Maximum BIB batch size for every run is fixed at 24.

Lowest Min. Batch Size to Run: 20 Highest Min. Batch Size to Run: 24 Step Size between Runs: 1

**Additional Settings**

BIB Load on Lot Criteria ☐ One lot per BIB ☐ Multiple lots per BIB

Resource Select Criteria

Lot Selection Criteria

Trolley Location Selection

☐ Show model on map

Run Simulation

Minimum allowable BIB batch size can be varied incrementally in a defined range. Maximum allowable size is fixed at 24.

1. Select the **lower bound** and **upper bound** of the range to run (from 1 to 24).
2. Select the **step size** between runs.

# App UI

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

**Lot Dispatch**  
Choose the lot sequencing rule(s) for the simulation to run. Please select at least one. "First-Come-First-Served" keeps the sequence supplied in Actual Lot Info.

Lot Sequencing Rule(s) to Run: ☒ First-Come-First-Served (Default) ☐ Shortest Processing Time ☐ Most Jobs ☐ Random

**BIB Batch Size**  
Choose the allowable minimum

Lowest Min. Batch Size to Run: 20 Highest Min. Batch Size to Run: 24 Step Size between Runs: 1

**Additional Settings**

BIB Load on Lot Criteria: ☐ One lot per BIB ☒ Multi lots per BIB

Resource Select Criteria: ☐ First Available ☐ Shortest Queue ☐ Shortest Distance ☒ Shortest Queue + Shortest Distance

Lot Selection Criteria for Loading: ☐ First-In-First-Out (FIFO) ☐ Lot with same loader kit & BIB type as previous lot processed ☒ Lot with same loader kit & BIB type as previous lot processed + Least changeover time

Trolley Location Select Criteria: ☐ Shortest Distance ☐ Shortest Queue ☒ Original Location

☐ Show model on FlexSim? ☐ Visualise on Tableau Server?

Run Simulation

Define additional settings (for **ALL** runs). Leave them as the default if unsure.

# App UI

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

### Lot Dispatch

Choose the lot sequencing rule(s) for the simulation to run. Please select at least one. "First-Come-First-Served" keeps the sequence supplied in Actual Lot Info.

Lot Sequencing Rule(s) to Run: ☒ First-Come-First-Served (Default) ☐ Shortest Processing Time ☐ Most Jobs ☐ Random

### BIB Batch Size

Choose the allowable minimum BIB batch size to run. A range can be run incrementally based on the step size. Maximum BIB batch size for every run is fixed at 24.

Lowest Min. Batch Size to Run: 20 Highest Min. Batch Size to Run: 24 Step Size between Runs: 1

Resource Select Criteria: ☐ First Available ☐ Shortest Queue ☐ Shortest Distance ☒ Shortest Queue + Shortest Distance

Lot Selection Criteria for Loading: ☐ First-In-First-Out (FIFO) ☐ Lot with same loader kit & BIB type as previous lot processed ☒ Lot with same loader kit & BIB type as previous lot processed + Least changeover time

Trolley Location Select Criteria: ☐ Shortest Distance ☐ Shortest Queue

☐ Show model on FlexSim? ☐ Visualise on Tableau Server?

Run Simulation

Select this to show the model graphics on FlexSim for each and every run.

By default, the output Tableau data visualisation dashboard will automatically be opened on **Tableau Desktop** (only if installed). Select this to open the dashboard on **Tableau Server** instead.

# Sample (Simulation Settings)

The screenshot shows the 'IBIS Simulation' application window. It has a menu bar with 'File' and 'Help'. Below the menu bar are three tabs: 'Simulation Settings' (selected), 'Run Parameters', and 'File Directories'. The main content area is divided into sections: 'Lot Dispatch', 'BIB Batch Size', and 'Additional Settings'. The 'Lot Dispatch' section has a description and four checkboxes for sequencing rules. The 'BIB Batch Size' section has a description and three numeric input fields. The 'Additional Settings' section has three groups of radio button options. At the bottom, there are two checked checkboxes and a 'Run Simulation' button.

**IBIS Simulation**

File Help

Simulation Settings Run Parameters File Directories

**Lot Dispatch**

Choose the lot sequencing rule(s) for the simulation to run. Please select at least one. "First-Come-First-Served" keeps the sequence supplied in Actual Lot Info.

Lot Sequencing Rule(s) to Run: ☒ First-Come-First-Served (Default) ☒ Shortest Processing Time ☒ Most Jobs ☐ Random

**BIB Batch Size**

Choose the allowable minimum BIB batch size to run. A range can be run incrementally based on the step size. Maximum BIB batch size for every run is fixed at 24.

Lowest Min. Batch Size to Run: 18 Highest Min. Batch Size to Run: 24 Step Size between Runs: 2

**Additional Settings**

BIB Load on Lot Criteria: ☒ One lot per BIB ☐ Multi lots per BIB

Resource Select Criteria: ☐ First Available ☒ Shortest Queue ☐ Shortest Distance ☐ Shortest Queue + Shortest Distance

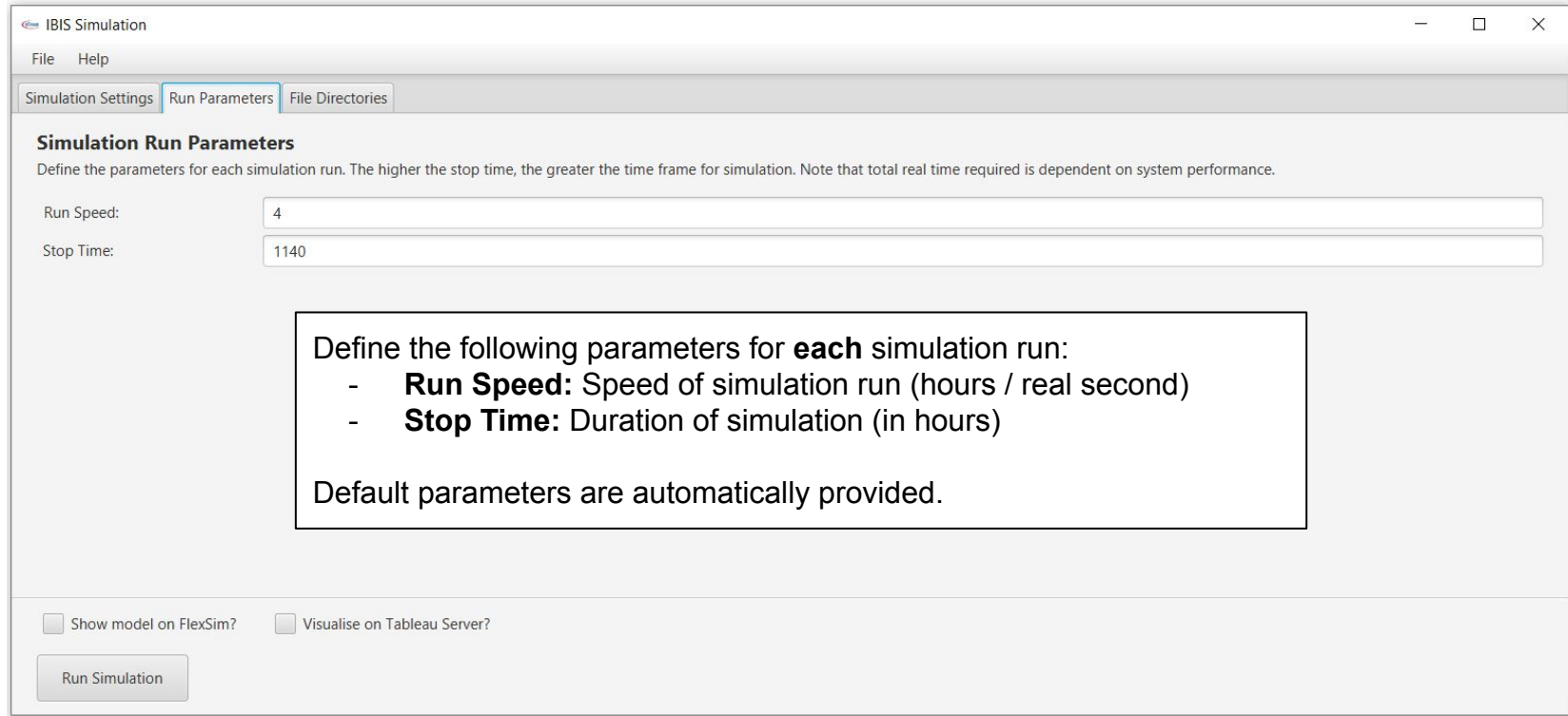
Lot Selection Criteria for Loading: ☐ First-In-First-Out (FIFO) ☒ Lot with same loader kit & BIB type as previous lot processed ☐ Lot with same loader kit & BIB type as previous lot processed + Least changeover time

Trolley Location Select Criteria: ☐ Shortest Distance ☐ Shortest Queue ☒ Original Location

☒ Show model on FlexSim? ☒ Visualise on Tableau Server?

Run Simulation

# App UI



The screenshot shows the 'IBIS Simulation' application window. It has a standard macOS-style title bar with minimize, maximize, and close buttons. Below the title bar is a menu bar with 'File' and 'Help' options. A tabbed interface is present with three tabs: 'Simulation Settings', 'Run Parameters' (which is currently selected and highlighted with a blue border), and 'File Directories'. The main content area of the 'Run Parameters' tab is titled 'Simulation Run Parameters' and includes a descriptive paragraph: 'Define the parameters for each simulation run. The higher the stop time, the greater the time frame for simulation. Note that total real time required is dependent on system performance.' Below this text are two input fields: 'Run Speed:' with the value '4' and 'Stop Time:' with the value '1140'. A large, bordered text box is overlaid on the right side of the main content area, containing instructions: 'Define the following parameters for **each** simulation run:' followed by a bulleted list: '- **Run Speed:** Speed of simulation run (hours / real second)' and '- **Stop Time:** Duration of simulation (in hours)'. Below the list, it states 'Default parameters are automatically provided.' At the bottom of the window, there are two unchecked checkboxes: 'Show model on FlexSim?' and 'Visualise on Tableau Server?'. A 'Run Simulation' button is located at the bottom left of the window.

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

### Simulation Run Parameters

Define the parameters for each simulation run. The higher the stop time, the greater the time frame for simulation. Note that total real time required is dependent on system performance.

Run Speed: 4

Stop Time: 1140

Define the following parameters for **each** simulation run:

- **Run Speed:** Speed of simulation run (hours / real second)
- **Stop Time:** Duration of simulation (in hours)

Default parameters are automatically provided.

☐ Show model on FlexSim? ☐ Visualise on Tableau Server?

Run Simulation



# App UI

Copy the address for each of the following files into its respective field:

- flexsim.exe in FlexSim 7.3 installation folder
- Base FlexSim model (.fsm)
- Input Excel file (.xlsx) with data
- Blank Output Excel file (.xlsx)

The screenshot shows the 'File Directories' tab in the 'IBIS Simulation' application. The window has a menu bar with 'File' and 'Help', and tabs for 'Simulation Settings', 'Run Parameters', and 'File Directories'. The 'File Directories' section contains instructions and four input fields for file paths:

- FlexSim (.exe): Drag here or type in the file address, e.g. C:\Program Files (x86)\FlexSim7.3\program\flexsim.exe
- Model (.fsm): Drag here or type in the file address, e.g. C:\Documents\IBIS Model.fsm
- Input Excel (.xlsx): Drag here or type in the file address, e.g. C:\Documents\Input.xlsx
- Output Excel (.xlsx): Drag here or type in the file address, e.g. C:\Documents\Output.xlsx

At the bottom, there are checkboxes for 'Show model on FlexSim?' and 'Visualise on Tableau Server?', and a 'Run Simulation' button.

Two file explorer windows are overlaid on the application:

- The top-right explorer shows the 'FlexSim7.3 > program' directory. The file 'flexsim.exe' is highlighted with a red box.
- The bottom-right explorer shows the 'Desktop > onelevel IBIS' directory. The files 'IBIS Model V1.013 PreCreated.fsm', 'Input.xlsx', and 'Model Output.xlsx' are highlighted with red boxes.

Arrows indicate the mapping of these files to the input fields: 'flexsim.exe' to the FlexSim (.exe) field, 'IBIS Model V1.013 PreCreated.fsm' to the Model (.fsm) field, 'Input.xlsx' to the Input Excel (.xlsx) field, and 'Model Output.xlsx' to the Output Excel (.xlsx) field.

**You can also drag the files directly into the fields!**

# Sample (File Directories)

The screenshot shows a software window titled "IBIS Simulation" with a standard Windows-style title bar (minimize, maximize, close buttons). Below the title bar is a menu bar with "File" and "Help". A tabbed interface is present, with "Simulation Settings", "Run Parameters", and "File Directories" tabs. The "File Directories" tab is active, displaying the "File Directories" section. A descriptive text states: "File locations are required for the simulation model to run. For Output Excel, simply create a new empty Excel file in the desired location for the simulation output to be generated." Below this text are four labeled text input fields: "FlexSim (.exe):" with the path "C:\Program Files (x86)\FlexSim7.3\program\flexsim.exe"; "Model (.fsm):" with the path "C:\Users\USER\onelevel IBIS\IBIS Model V1.013 PreCreated.fsm"; "Input Excel (.xlsx):" with the path "C:\Users\USER\onelevel IBIS\Input.xlsx"; and "Output Excel (.xlsx):" with the path "C:\Users\USER\onelevel IBIS\Model Output.xlsx". At the bottom of the window, there are two checked checkboxes: "Show model on FlexSim?" and "Visualise on Tableau Server?". A "Run Simulation" button is located at the bottom left.

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

### File Directories

File locations are required for the simulation model to run. For Output Excel, simply create a new empty Excel file in the desired location for the simulation output to be generated.

FlexSim (.exe): C:\Program Files (x86)\FlexSim7.3\program\flexsim.exe

Model (.fsm): C:\Users\USER\onelevel IBIS\IBIS Model V1.013 PreCreated.fsm

Input Excel (.xlsx): C:\Users\USER\onelevel IBIS\Input.xlsx

Output Excel (.xlsx): C:\Users\USER\onelevel IBIS\Model Output.xlsx

☒ Show model on FlexSim? ☒ Visualise on Tableau Server?

Run Simulation

# Run Simulation

IBIS Simulation

File Help

Simulation Settings Run Parameters File Directories

### File Directories

File locations are required for the simulation model to run. For Output Excel, simply create a new empty Excel file in the desired location for the simulation output to be generated.

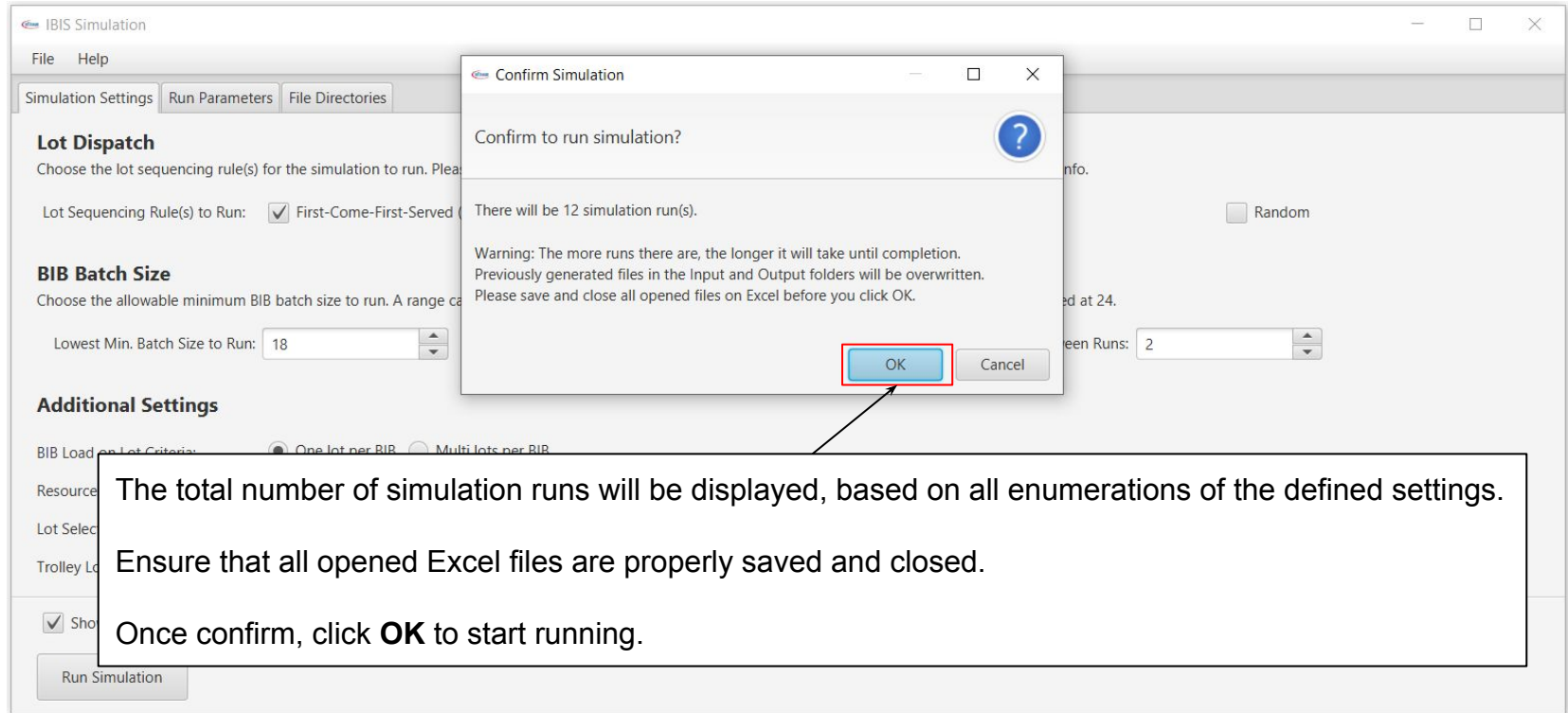
FlexSim (.exe):	C:\Program Files (x86)\FlexSim7.3\program\flexsim.exe
Model (.fsm):	C:\Users\USER\onelevel IBIS\IBIS Model V1.013 PreCreated.fsm
Input Excel (.xlsx):	C:\Users\USER\onelevel IBIS\Input.xlsx
Output Excel (.xlsx):	C:\Users\USER\onelevel IBIS\Model Output.xlsx

Once ready, click **Run Simulation** to start running all the desired simulation runs.

☒ Show model on FlexSim? ☒ Visualise on Tableau Server?

Run Simulation

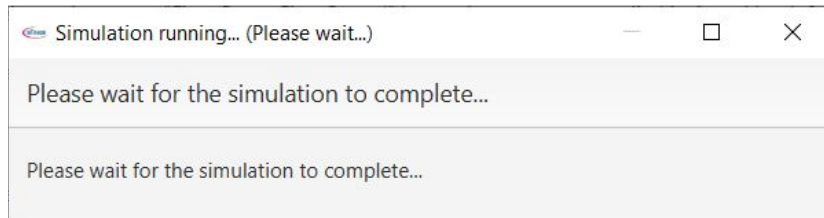
# Run Simulation



# Run Simulation

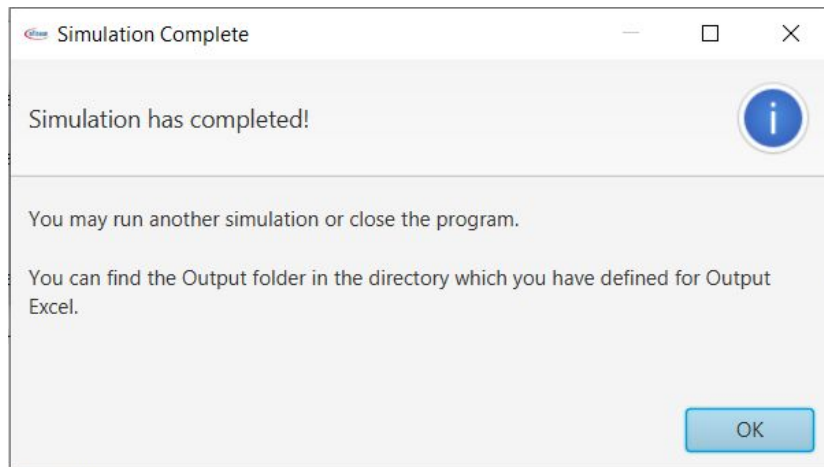
Please wait when all the simulation runs are running.

You should see a progress bar for each simulation run.



Once all the runs have successfully completed, a 'Simulation Complete' message will be shown.

The Tableau dashboard will be launched automatically (Tableau Desktop opens only if installed).



# Generated Files

> onelevel IBIS

Name

IBIS Model V1.013 PreCreated.fsm

Trolley.skp

Loader.skp

Input.xlsx

LotTrolley.skp

Transfer.skp

Oven2.skp

Oven.skp

BIBType.skp

LoaderKit.skp

Model Output.xlsx

Input

Output

> onelevel IBIS > Input

Name

- FCFS\_18\_min\_size\_input.xlsx
- FCFS\_20\_min\_size\_input.xlsx
- FCFS\_22\_min\_size\_input.xlsx
- FCFS\_24\_min\_size\_input.xlsx
- MJ\_18\_min\_size\_input.xlsx
- MJ\_20\_min\_size\_input.xlsx
- MJ\_22\_min\_size\_input.xlsx
- MJ\_24\_min\_size\_input.xlsx
- SPT\_18\_min\_size\_input.xlsx
- SPT\_20\_min\_size\_input.xlsx
- SPT\_22\_min\_size\_input.xlsx
- SPT\_24\_min\_size\_input.xlsx

<< Output > Raw Output Excel Files

Name

- FCFS\_18\_min\_size\_output.xlsx
- FCFS\_20\_min\_size\_output.xlsx
- FCFS\_22\_min\_size\_output.xlsx
- FCFS\_24\_min\_size\_output.xlsx
- MJ\_18\_min\_size\_output.xlsx
- MJ\_20\_min\_size\_output.xlsx
- MJ\_22\_min\_size\_output.xlsx
- MJ\_24\_min\_size\_output.xlsx
- SPT\_18\_min\_size\_output.xlsx
- SPT\_20\_min\_size\_output.xlsx
- SPT\_22\_min\_size\_output.xlsx
- SPT\_24\_min\_size\_output.xlsx

Raw Input Excel files and Output Excel files are generated in these folders for your reference.

> onelevel IBIS > Output

Name

- Raw Output Excel Files
- IBIS\_Simulation\_Output\_Visualisation.twb
- tableau-excel-file.xlsx

Tableau workbook for output data visualisation (IBIS\_Simulation\_Output\_Visualisation.twb) is generated in the Output folder, along with the data Excel file (tableau-excel-file.xlsx).

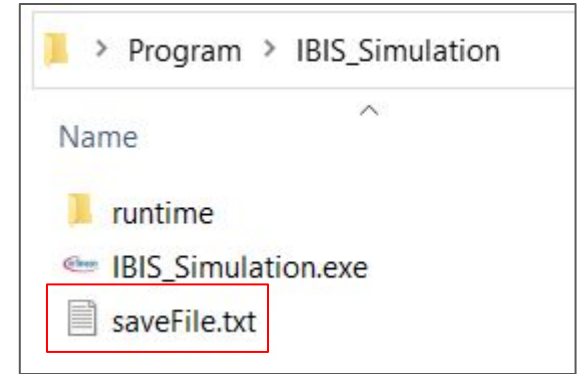
An **Input** folder and **Output** folder will be created in the same directory as the **Input Excel** file and **Output Excel** file respectively.

Note that these files and folders will be overwritten each time the simulation is executed!

# New, Open, Save

Under File, there are 3 options:

- **New:** Resets the input fields to default.
- **Open:** Opens the previously saved input fields.
- **Save:** Saves the current input fields.



The input fields are saved in a .txt file, in the same folder as IBIS\_Simulation.exe.

They are automatically saved upon running of simulation and exiting the application.