

# Silane Deposition: Introduction

CPFD Software

[www.cpfd-software.com](http://www.cpfd-software.com)

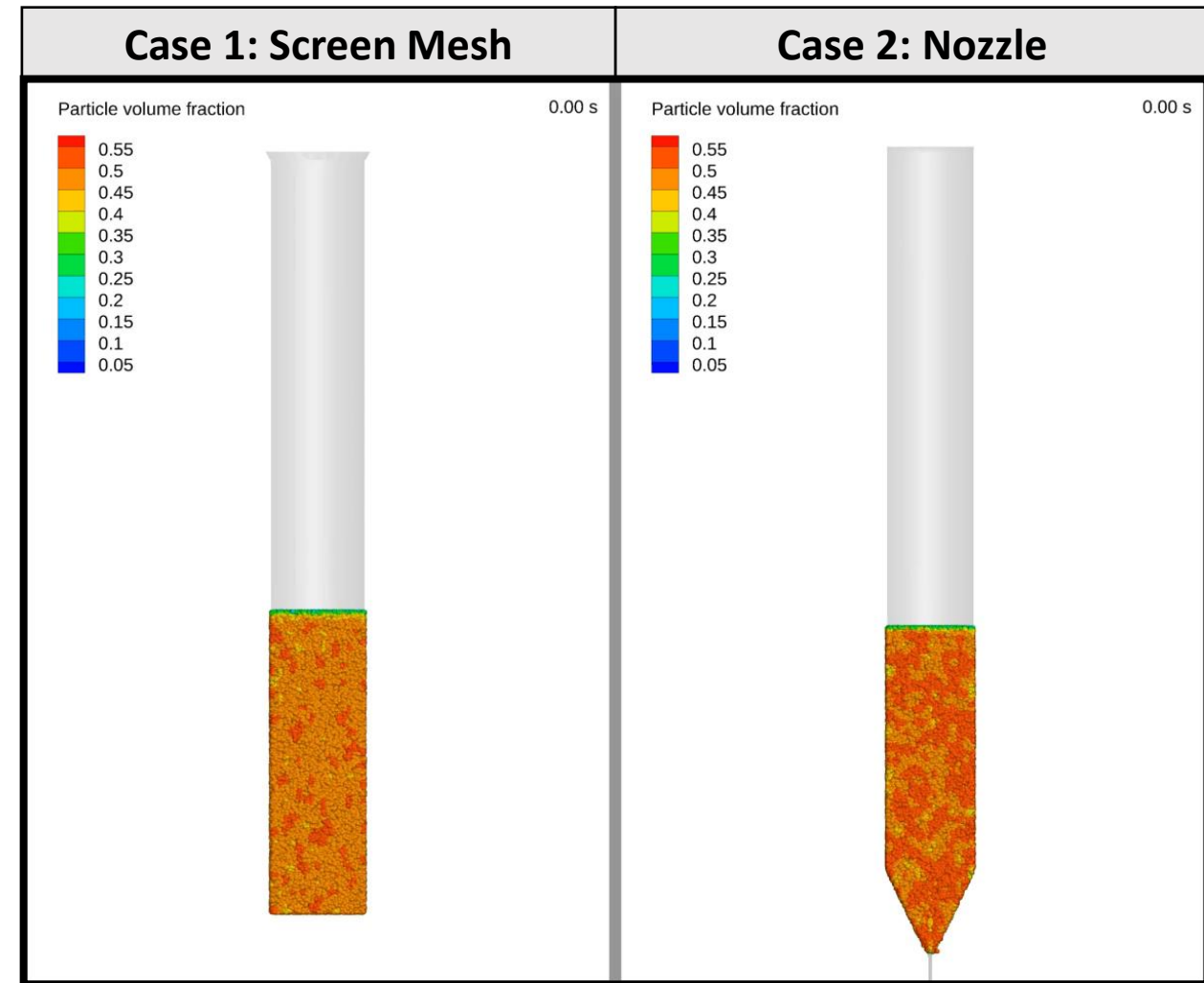
# Overview

This example shows how to setup and run a comparison of two different geometries for the deposition of solid Silicon in a fluidized bed system.

- Case 1: Screen Mesh Geometry (uniform flow)
- Case 2: Nozzle Geometry (jet flow)

Simulation developed from previous work done by James Parker in 2011:

<https://cpfd-software.com/validation-of-a-polysilicon-deposition-reactor/>



# Analysis: Silicon Deposition Rate

The average rate of Silicon deposition is compared for the two geometries

For a 57 mol% Silane feed, the deposition rate of Silicon is:

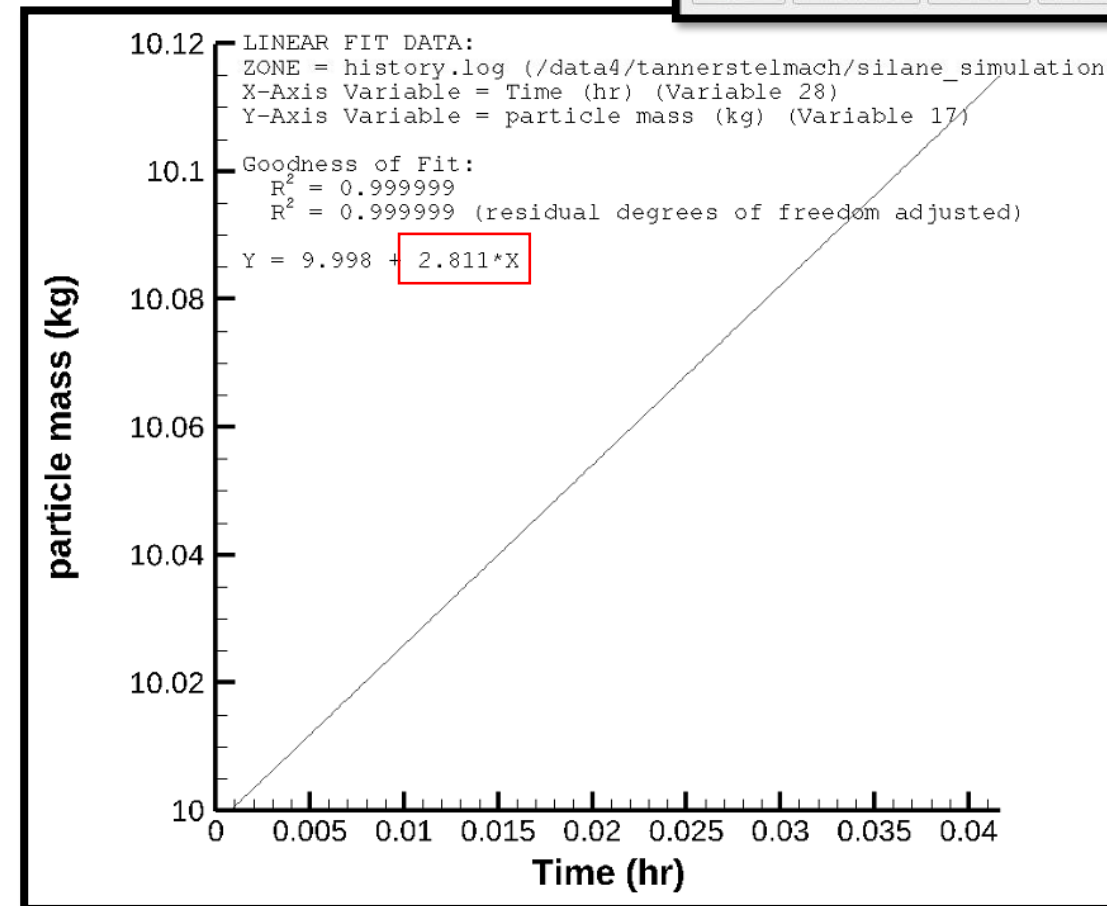
- Screen Mesh: **2.81 kg/hr**
- Nozzle: **1.81 kg/hr**

Mapping Style

Definitions Lines Curves Symbols Error Bars Bar Charts Indices

Map Number	Map Name	Show Map	X-Axis Variable	Y-Axis Variable	
16	particle mass (kg)	<input checked="" type="checkbox"/>	1: Time (s)	17: particle mass (...)	1: histor
17	warning count	<input type="checkbox"/>	1: Time (s)	18: warning count	1: histor
18	pVolFrac low count	<input type="checkbox"/>	1: Time (s)	19: pVolFrac low co...	1: histor
19	pVolFrac medium count	<input type="checkbox"/>	1: Time (s)	20: pVolFrac mediu...	1: histor
20	pVolFrac high count	<input type="checkbox"/>	1: Time (s)	21: pVolFrac high c...	1: histor
21	pVolFrac adjustment count	<input type="checkbox"/>	1: Time (s)	22: pVolFrac adjust...	1: histor

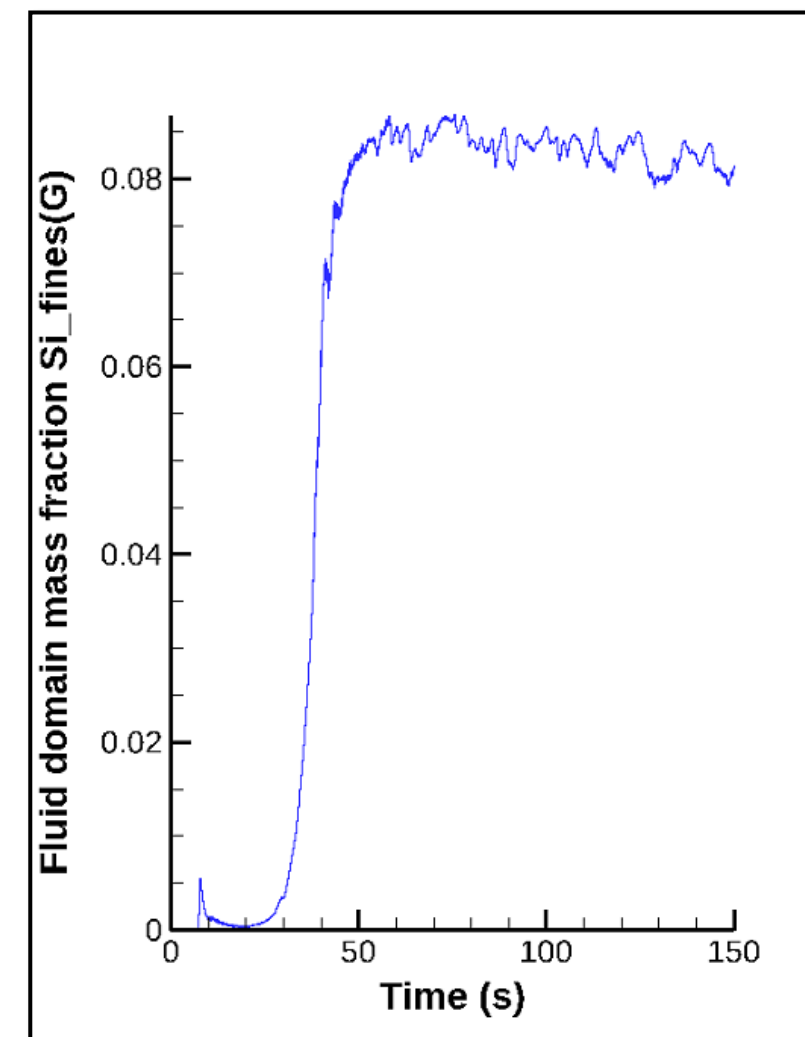
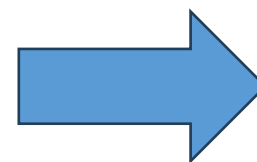
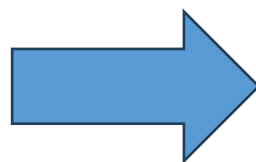
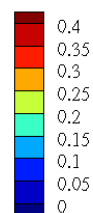
Selection criteria:



# Analysis: Silicon fines production

Silicon fines production will be calculated from a flux plane defined at the top of the reactor

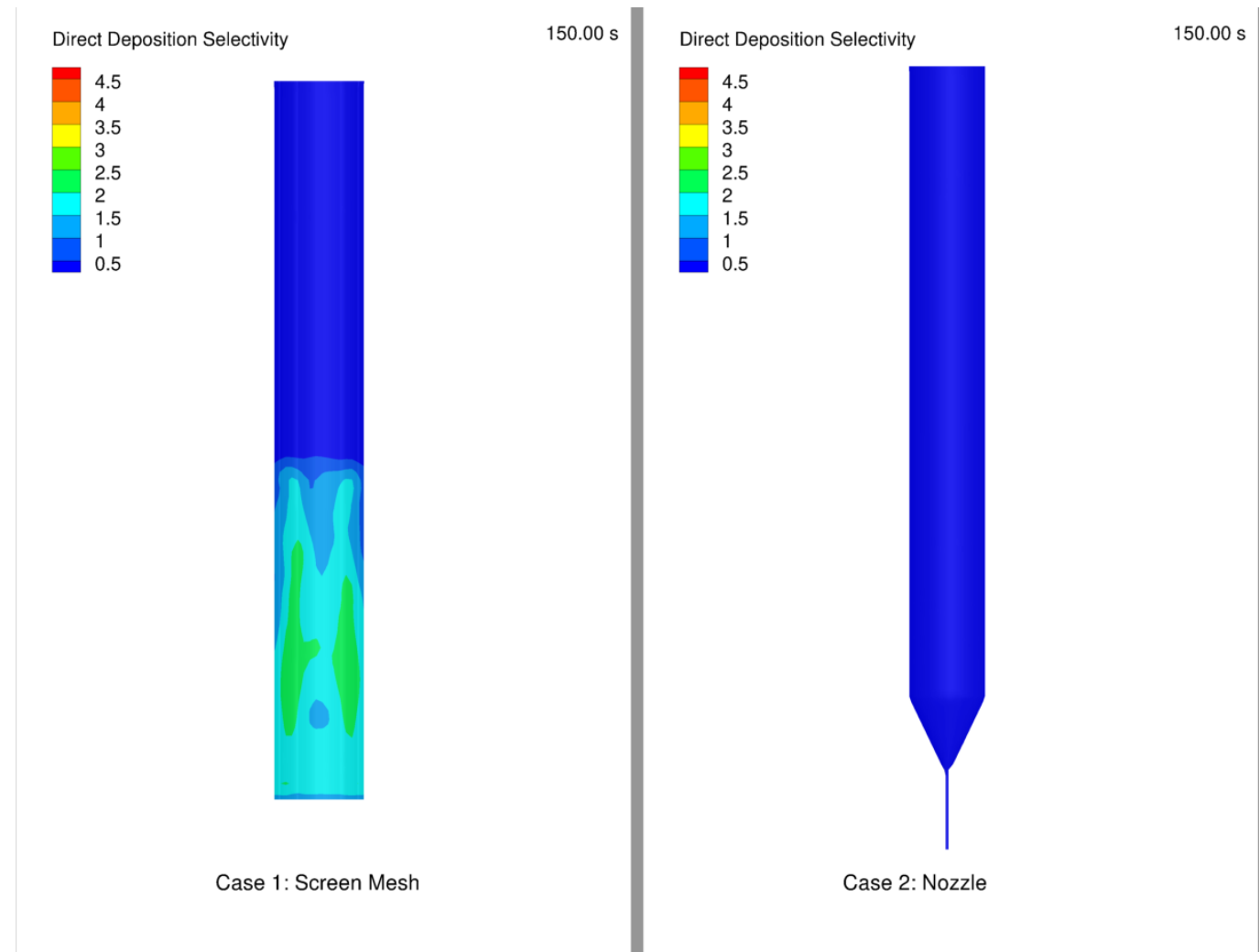
Time-averaged fluid domain mass fraction Si\_fines(G)



# Analysis: Direct Deposition Reaction Selectivity

Reaction rate outputs are used to spatially analyze the reaction selectivity of direct deposition

These results ultimately show that screen mesh configuration is favorable



# Comparison with Experimental Data

Data for comparison: deposition rate and silicon fines production

