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Modeling Data and Reactor Data Associated with the Design, Modeling, and Testing of the Pressurized Oxy-Coal (POC) Reactor

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This file describes the available data files for the **Modeling Data** and **Reactor Data** associated with the design, modeling, and testing of the Pressurized Oxy-Coal (POC) reactor.

Explanation of Modeling Data

This document describes the names and content of the files in this folder as of Feb 2021. These files are related to modeling of the POC system.

File Name	File Type	Description
BYU_Dry_Feed_Reactor_Baseline	PowerPoint	Reactor CFD results for 4-small lance burner
BYU_Dry_Feed_Reactor_Case2	PowerPoint	Reactor CFD results for 8-large lance burner
BYU_Dry_Feed_Reactor_Case3	PowerPoint	Reactor CFD results for 8-small lance burner
Dense Coal Transport Modeling Summary	PowerPoint	CFD results for dense coal modeling in dry feed system
Dimensional Adaptive Radiation Summary	PowerPoint	Reactor radiation heat transfer simulation results with adaptive mesh technique
FENICS profiles_28Jun17	Excel	Reactor temperature and heat transfer results based on FENICS process/CFD model
Initial Stoichiometry and Process Calcs	Excel	Reactor process conditions calculated with stoichiometric calculations and the SteamGenExpert process model

Explanation of Reactor Data

Files for the POC reactor data are found in the following formats

Folder Name: The folder name contains the test number and date the format is

POC_Coal_test#_Month_Day_Year

Within each folder the following file types and naming systems are used

OPTO22 Data files: *.H## - These are files containing the raw comma delimited data produced by the OPTO22 data acquisition software. The naming structure is:

RTyear_month_day_hour_minute_second-H## where H## designates a group of data that are recorded at the same sampling rate. The groups are

H00 - Date,Time,B - Inner/Top (F),B - Inner/Middle Top (F),B - Inner/Middle (F),B - Inner/Middle Bottom (F),B - Inner/Bottom (F),B - Outer/Top (F),B - Outer/Middle Top (F),B - Outer/Middle (F),B - Outer/Middle Bottom (F),B - Outer/Bottom (F),Inner Temperature Top (F),Inner Temperature Middle Top (F),Inner Temperature Middle (F),Inner Temperature Middle Bottom (F),Inner Temperature Bottom (F),Heat Rate Top (W),Heat Rate Top Middle (W),Heat Rate Middle (W),Heat Rate Bottom Middle (W),Heat Rate Bottom (W),Magnet 1,Magnet 2,Magnet 3,Magnet 4,Magnet 5,Magnet 6,Magnet 7,Magnet 8

H01 - Date,Time,K-SS HX,K-SS Reactor,K-Coolant In,K-Coolant Out,K-Spray Flue Gas,K-HX Flue In,K-HX Flue Out,K-HW Weld,K-Rupture Disk,K-Opto Box,Coolant Flow (GPH),Spray Flow Meter (GPH)

H02 - Date,Time,Thermopile Voltage 1 (V),Thermopile Voltage 2 (V),Thermopile Voltage 3 (V),Thermopile Voltage 4 (V),Thermopile Voltage 5 (V),Reference Voltage 1 (V),Reference Voltage 2 (V),Reference Voltage 3 (V),Reference Voltage 4 (V),Reference Voltage 5 (V),Thermistor 1 (Ohms),Thermistor 2 (Ohms),Thermistor 3 (Ohms),Thermistor 4 (Ohms),Thermistor 5 (Ohms),Thermistor Temperature 1 (F),Thermistor Temperature 2 (F),Thermistor Temperature 3 (F),Thermistor Temperature 4 (F),Thermistor Temperature 5 (F),R_Temp_1_F,R_Temp_2_F,R_Temp_3_F,R_Temp_4_F,R_Temp_5_F

H05 - Date,Time,Reactor Pressure (psig.),NG Flow Rate (kg/hr),Air Flow Rate (kg/hr),CO2_Flowrate(kg/hr)[Annulus],CO2_Flowrate(kr/hr)[Tertiary],O2_Flowrate(kg/hr)[Annulus],O2_Flowrate(kg/hr)[Tertiary],O2 % Vol(Horiba),CO2 % Vol(Horiba),CO PPM(Horiba),NOx PPM(Horiba),SO2 PPM(Horiba),O2 Sensor(Zirconium)

H06 - Date,Time,Coal Feed Mass (kg),CO2 (MFC 9) Flowrate (kg/hr),CO2 (MFC 8) Flowrate (kg/hr),Coal Pressure Transmitter (psig.),Coal_Mass_Flow_Rate_Setpoint (kg/hr),Coal_Mass_Flow_Rate (kg/hr),Fluidized_Coal_BV_Solenoid_CF.State

H07 - Date,Time,Reactor Pressure (psig.)(P1),Reactor Pressure (psig.)(P2),Reactor Pressure (psig.)(P3),Coal Feed (psig.),Dilution Damper (psig.),Cyclone (psig.),Purge (psig.),Badger Position (% Open)

OPTO Files Converted to .CSV format. – These are the original comma delimited files converted to Microsoft excel *.CSV format. They have the same names as the original OPTO22 data files but now have the .CSV extension instead of the H## extension. The files naming formats are: RTyear_month_day_hour_minute_secondH##.csv

EXCEL Complete Data files – These files contain all or compilations of the individual group data files combined into a single file. The naming convention is Coal_test_month_date_complete-data.xlsx

Word Files – Word files are located in some of the folders containing discussions of the data taken on the date of the test. These files do not exist for every test. An example is Coal_test_four_5_21.docx This file explains the test and results obtained for test #4 taken on May 5, 2021.

A word file APPENDIX G. PRESSURIZED COAL TESTS.doc is describes the results of the first six tests used to characterize the reactor performance. The file is text taken from a BYU MS thesis written by Scott Gardner. <https://scholarsarchive.byu.edu/etd/9290/>