

The Insight of CFD

Computational Fluid Dynamics (CFD) is increasingly being applied to the modelling of fire and smoke. One of the most popular packages is Fire Dynamics Simulator (FDS) developed by National Institute of Standards and Technology (NIST), which now supports the modelling of Aspirating Smoke Detection (ASD) Systems.

AspireSDS (ASPIRE Smoke Detection Simulation) is a tool which offers a more intuitive interface for preparing FDS input files and uniquely provides a data converter for importing Xtralis ASD layout and performance parameters from ASPIRE2 into FDS.

Easy Access to FDS

To operate, FDS requires clear definition of many parameters – including the space, objects within the space, doors and windows, material properties, surface properties, initial environmental conditions, pressure driven flows and heat sources. FDS is the most respected and predominant tool of its type and very complex models are possible, but the parameters are defined in a text file format which is cumbersome, time consuming and prone to errors.

Clearly, where prediction of detector response is desired, the location and characteristics of each detector must be specified within the FDS input file. While it is quite easy to provide the coordinates of each point detector (or each sampling point in the case of ASD), defining the characteristics of each is not trivial. For point detectors there are several alternative sub-models, with various parameters to specify such as characteristic length (entry lag time) while for ASD detectors the flow rate into each sampling hole and the delay (or transport time) associated with each hole must be defined.

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Text input required by FDS is cumbersome.

Even where this data is known it is time consuming to prepare it in the text format required by FDS.

What is AspireSDS?

Jointly developed by Xtralis and Worcester Polytechnic Institute (WPI), the ASPIRE Smoke Detection Simulation tool (AspireSDS) is a software package to help generate FDS (version 5) input files for predicting the response of smoke detectors. AspireSDS converts standard Xtralis ASPIRE2 pipe network designs into FDS simulation domains.

AspireSDS provides an intuitive Windows interface to allow users to set most of the parameters required in FDS modelling, including geometry and environmental conditions, fuel and fire configurations, and various fire detection technologies. Parameters for the FDS simulation can be specified through several tabbed groups: Simulation Setup, Geometry Setup, Materials and Reaction Setup, Device & Control Setup, Output Setup, and Advance Setup. For fire detector set-up, all FDS5 supported detectors, including ASD detectors, can be configured in the Device groups manually.

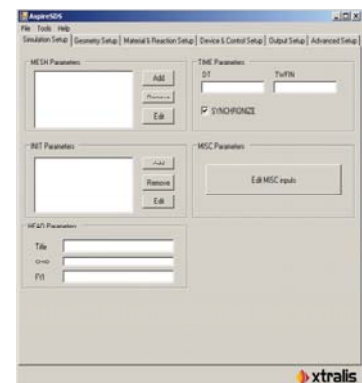
AspireSDS supports VESDA and ICAM pipe network components including various sampling vents. By combining those components, complicated pipe layouts from challenging protection options are able to be embedded in FDS simulations.

Features:

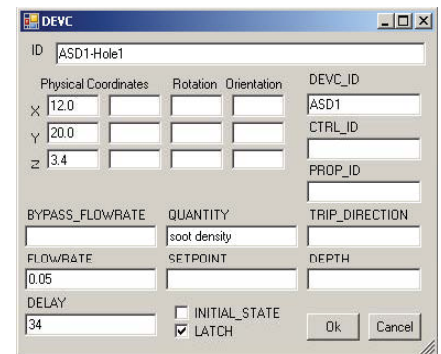
- Develop FDS models with all environmental parameters:
 - Mesh and boundaries
 - Objects, holes (doors and windows), vents
 - Surface parameters
- Materials and fire properties
- Control functions
- Detection device entries
- Automated Xtralis ASD design input

Benefits:

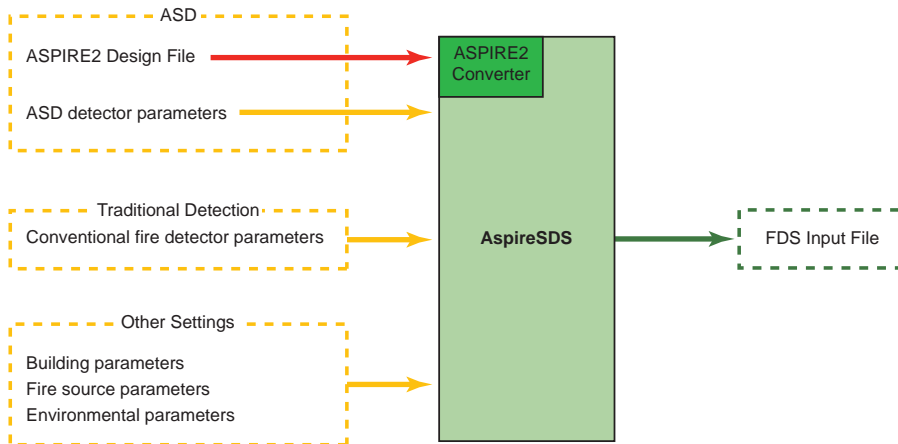
- Easier construction of the simulation domain
- Easier data entry of smoke detection systems
- Enables comparisons of the detection performance of:
 - Technology types (point smoke, point heat, beam and ASD)
 - Specific product types
- Increases efficiency and minimizes effort and error to engineer and prove a performance based solution



AspireSDS provides an efficient workflow for setting of all common FDS parameters



ASD design parameters



Flow Chart for AspireSDS

Specifications

Computer Requirements

PC with Windows® 2000, XP or Vista
Modelling Software Requirements
NIST FDS ver 5.1.2 (or later)
Xtralis ASPIRE2 ver 2.01.00-3185 (or later)

Xtralis Detector Models Supported

VESDA and ICAM devices supported by ASPIRE2

ASD Modelling options supported

Automated conversion of ASD pipe network design parameters into FDS input files with:

- Multiple Detectors in Simulation
- Normal and Worst-Case Detection Scenarios
- Protection of Multiple Zones
- Detection of other gases

Ordering Information

A copy of the AspireSDS software can be provided upon successful registration.

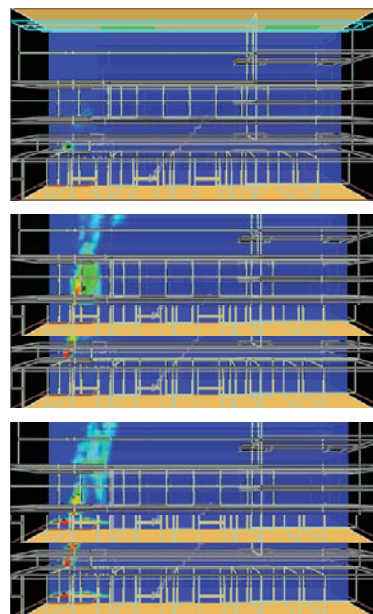
Visit www.xtralis.com/aspiresds for more information.

An Improved Model

Xtralis AspireSDS dramatically increases the “programming” speed and efficiency, and greatly eliminates syntax errors and typos. Xtralis AspireSDS allows fire consultants and engineers to model ASD technology in many complicated applications more accurately and with greater confidence, allowing them to devote more focus on the important matters of fire configuration and environmental settings.

Assisting in Performance Based Design

Using AspireSDS to integrate ASD designs into FDS enables comparisons of the performance of different technology types and product types. AspireSDS makes it simple to compare Xtralis detector response times with conventional detector types (e.g. point smoke detectors, heat detectors, and beam detectors). In this way, novel performance-based designs can be verified and recommendations justified in fire safety engineering reports.



An example of fire modelling using FDS.

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