

Olsson Fire & Risk

CONSULTING ENGINEERS



FEMTC 2016

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MESH TECHNIQUES AND UNCERTAINTY FOR MODELLING IMPULSE JET FANS

DR SAM ALSHROOF

JETFANS AS AN ALTERNATIVE SOLUTION

- The production of high air volume at high jet velocity is the key factor to entrain the flow downstream of a jetfan.
- This entrainment behaviour makes the use of jetfans in car parks preferable compared to traditional duct work.

JETFANS AS AN ALTERNATIVE SOLUTION

- Types of car park Jetfans:
 - Jetstream Impulse jet fan



- Centrifugal Induction fan

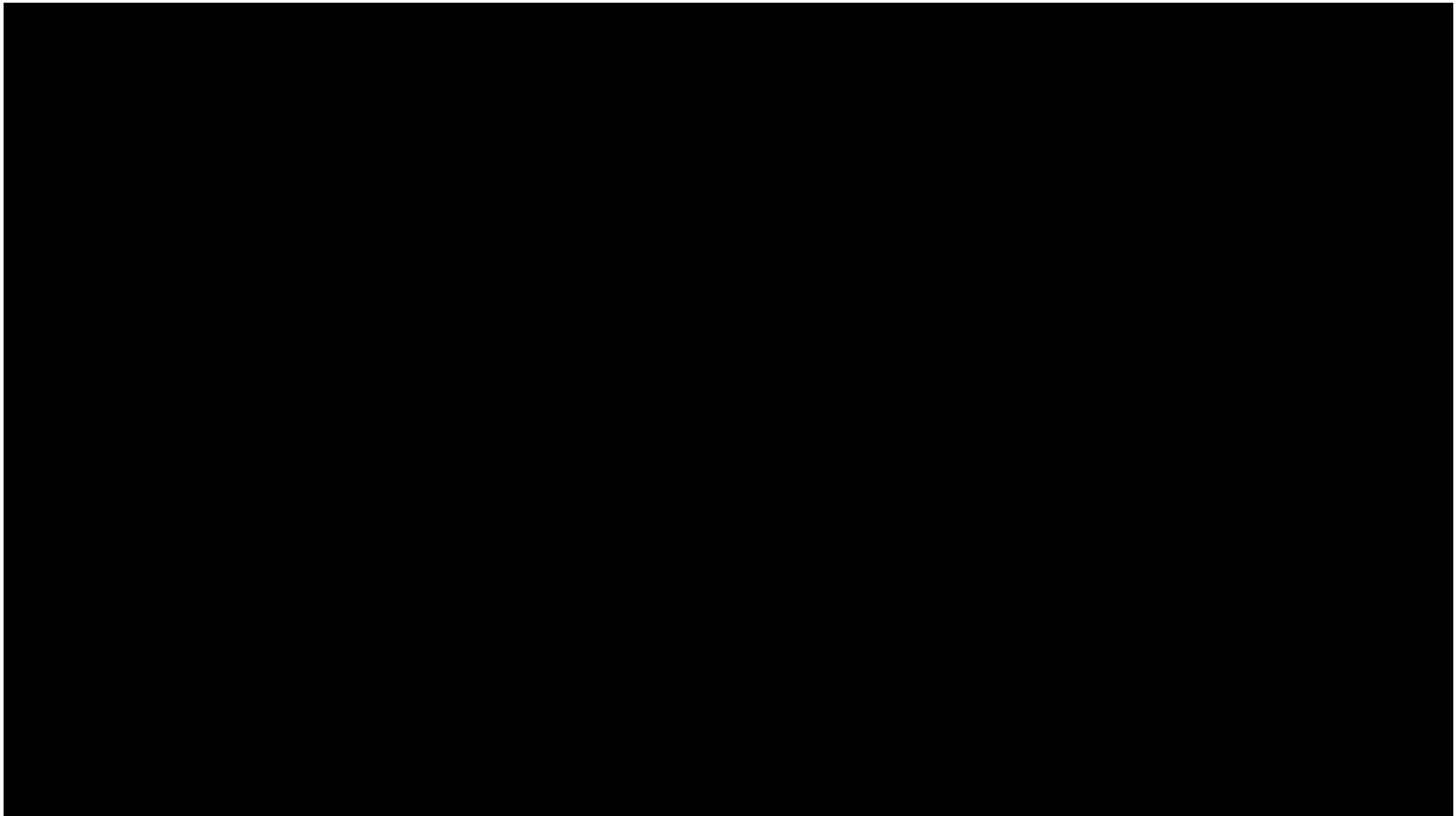


JETFANS AS AN ALTERNATIVE SOLUTION

- WHY Jetfans?
 - Experiment carried out by Colt in 2004 involved comparative full-scale tests in an underground car park sized 50 x 30 x 3 m, in Bristol, UK.
 - A comparison between traditional ducted system carpark and Jetfans as alternative solution.

JETFANS AS AN ALTERNATIVE SOLUTION

Colt in 2004



JETFANS AS AN ALTERNATIVE SOLUTION

- Tools of designing car parks

- Recommendation of manufacturer
- Using CFD



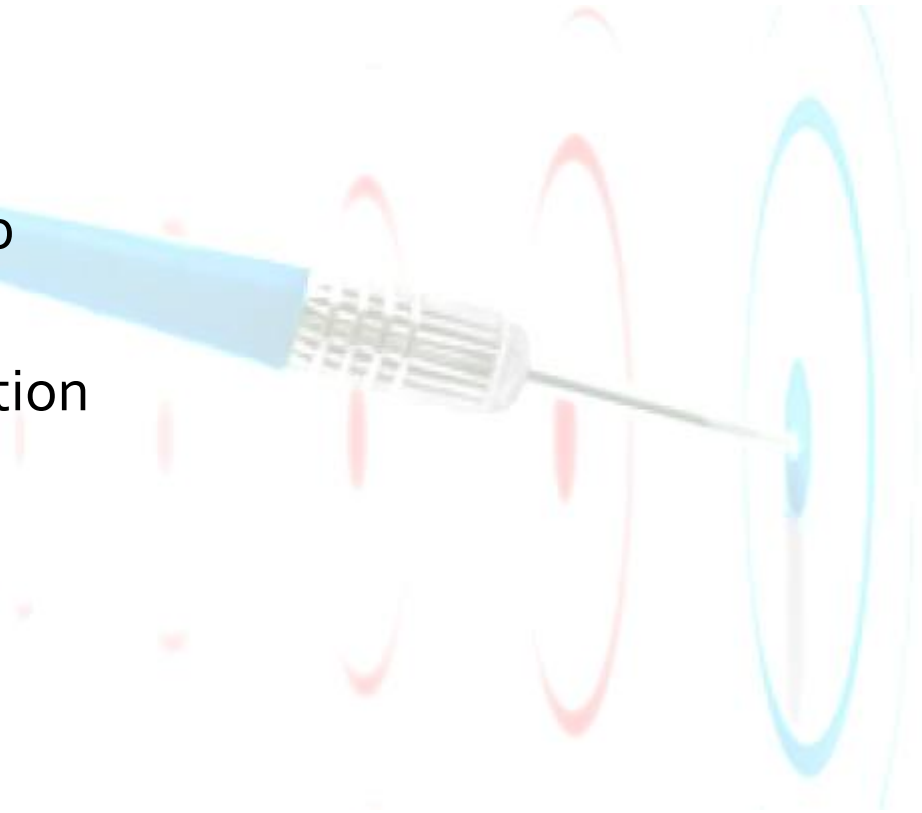
JETFANS AS AN ALTERNATIVE SOLUTION

- Things to check when conducting a CFD study:
 - Verification
 - Validation

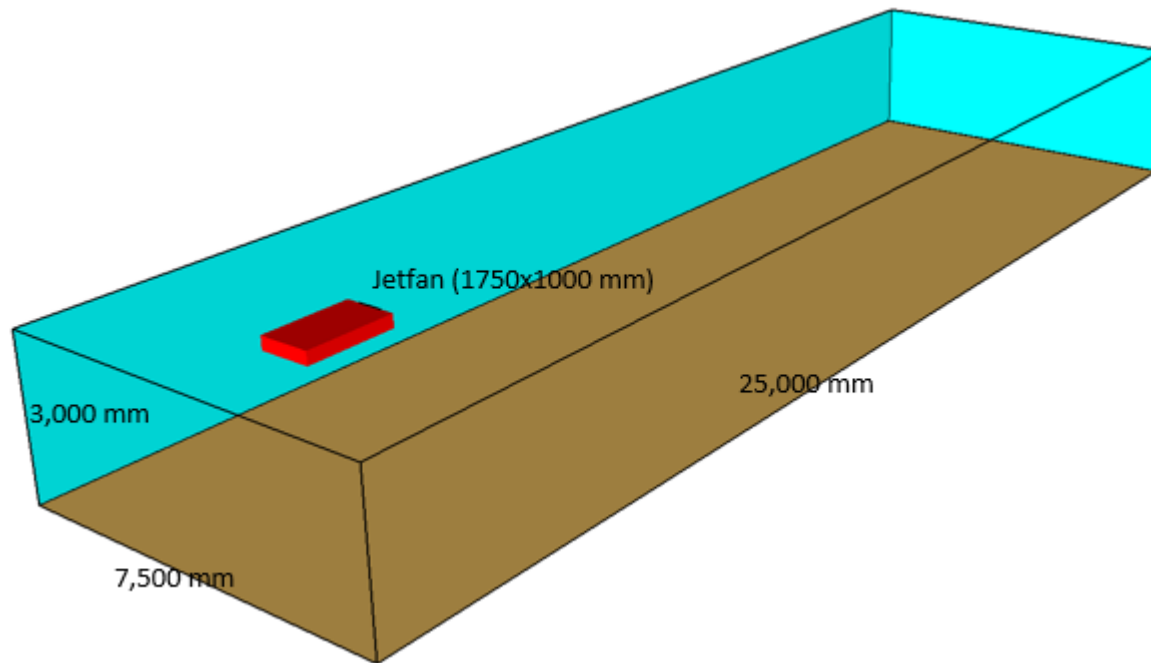


JETFANS AS AN ALTERNATIVE SOLUTION

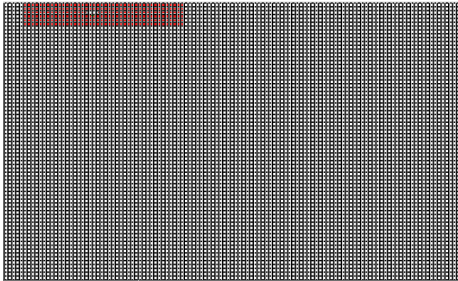
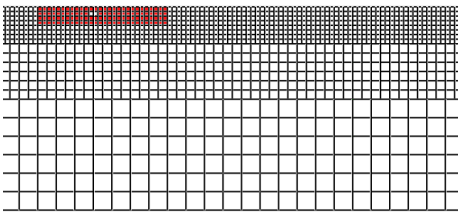
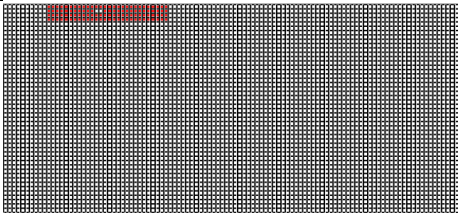
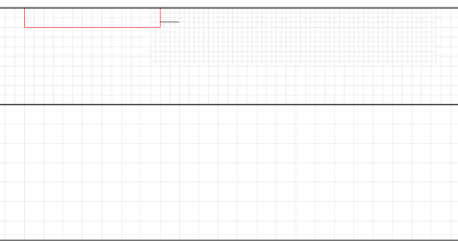
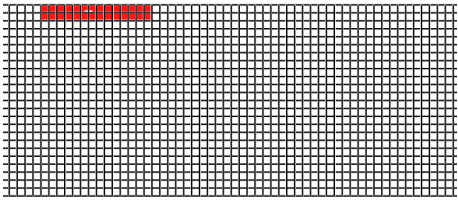
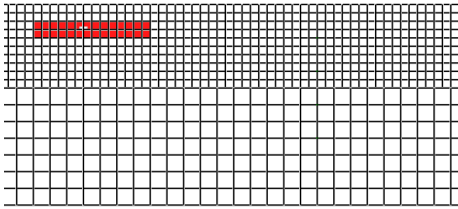
- Verification:
 - Code
 - Iteration, and time step
 - Mesh
 - Geometrical simplification
 - Turbulence model
- Validation
 - Not available



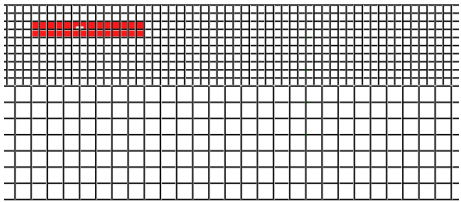
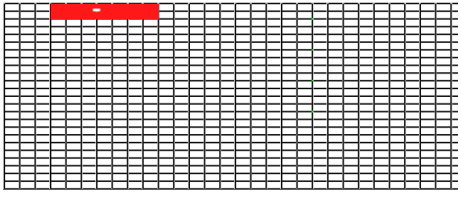
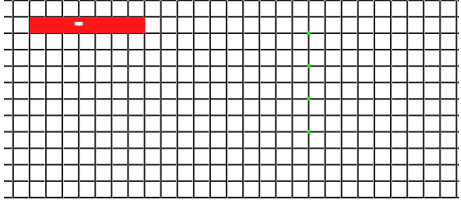
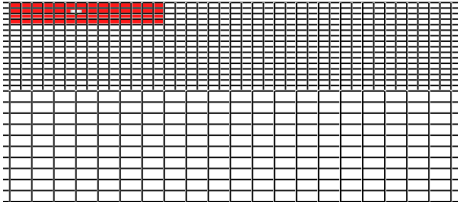
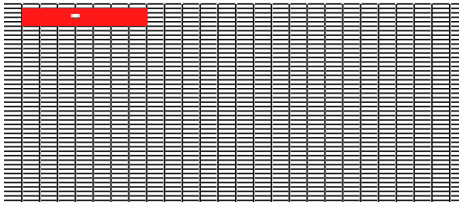
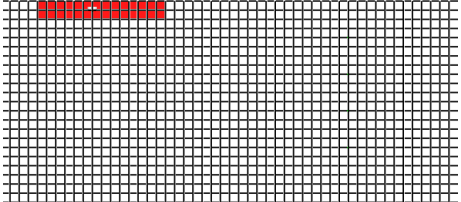
JETFAN NUMERICAL MODAL



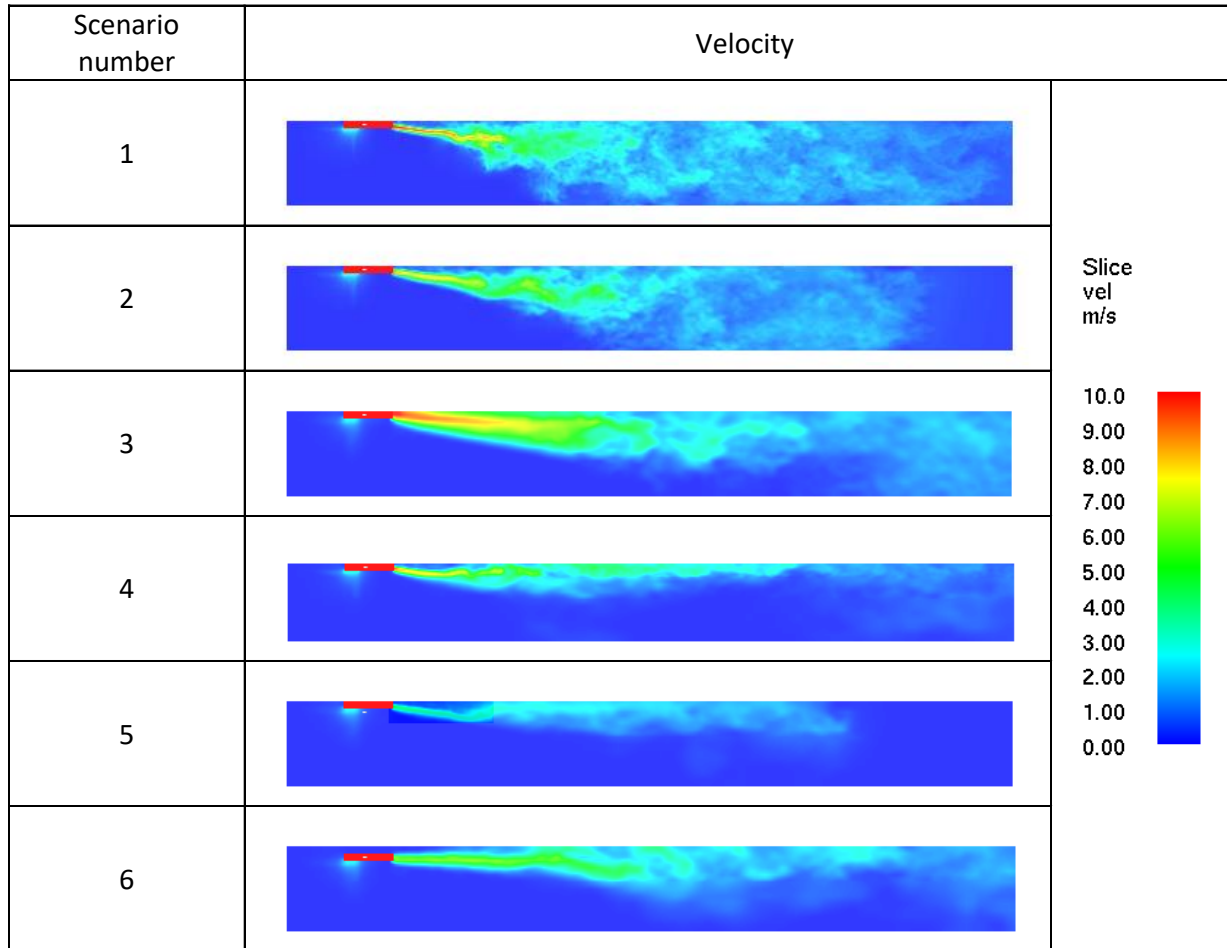
MESHING

Case #	Mesh	Case #	Mesh
1		4	
2		5	
3		6	

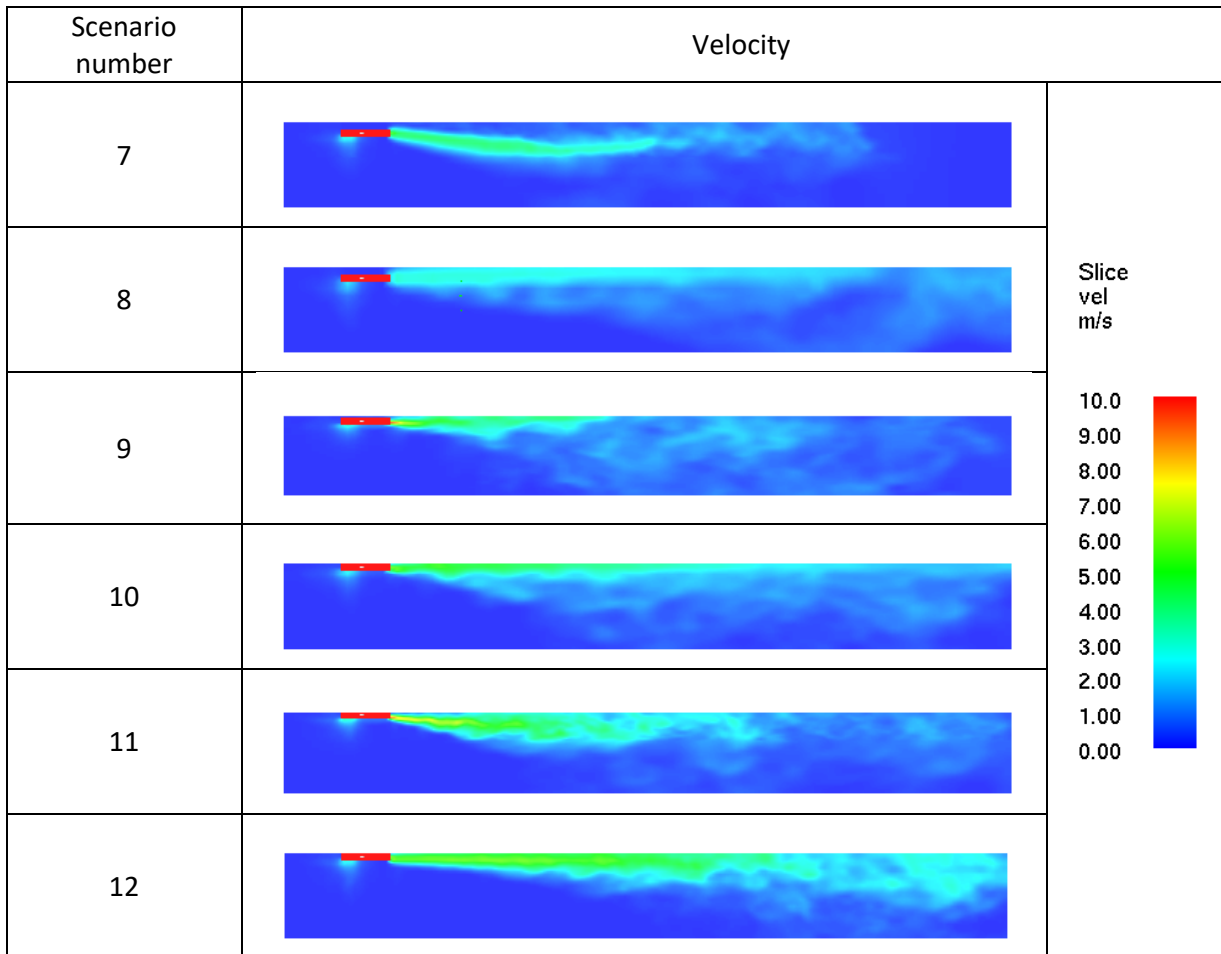
MESHING

Case #	Mesh	Case #	Mesh
7		10	
8		11	
9		12	

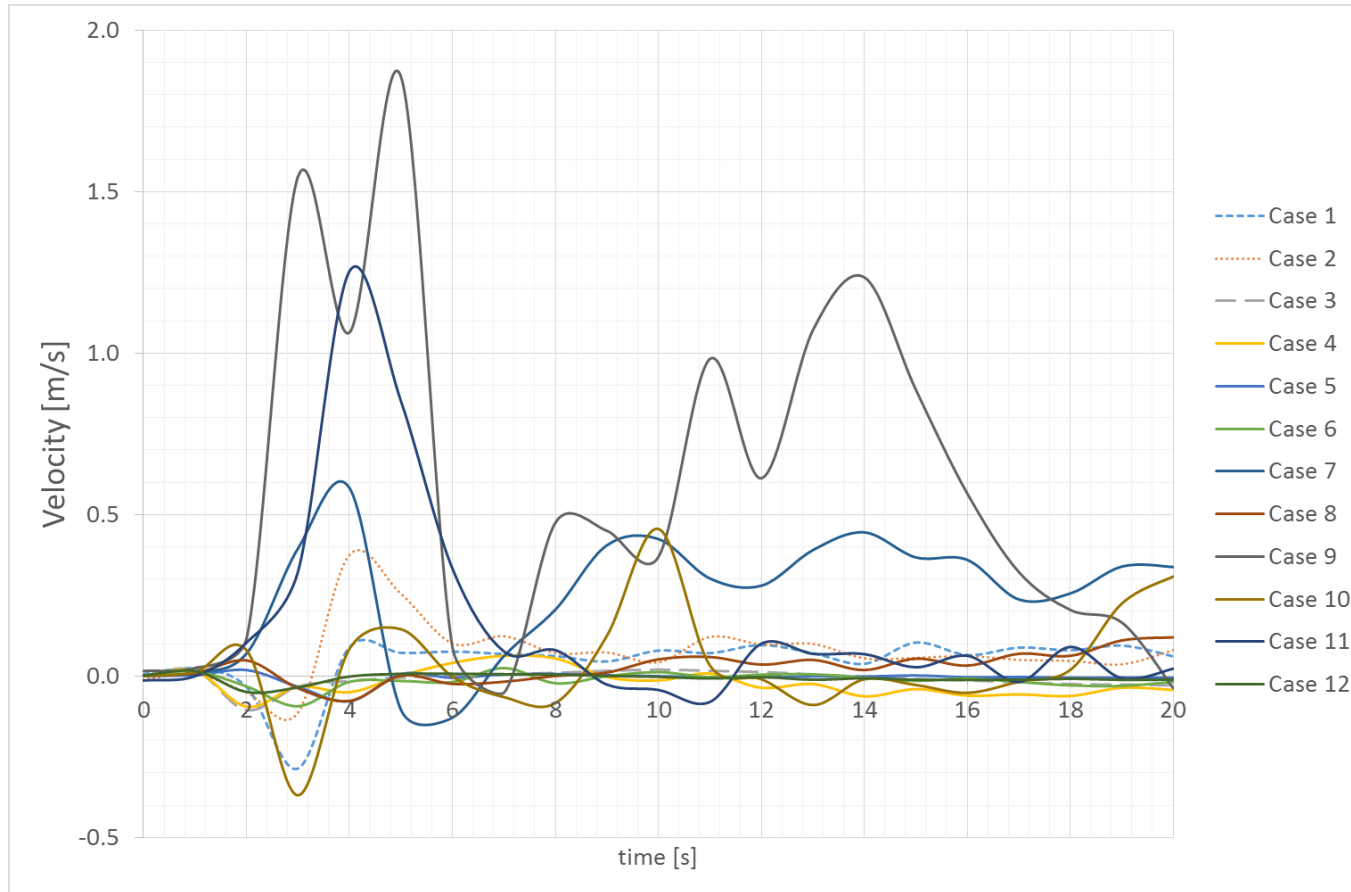
RESULTS



RESULTS

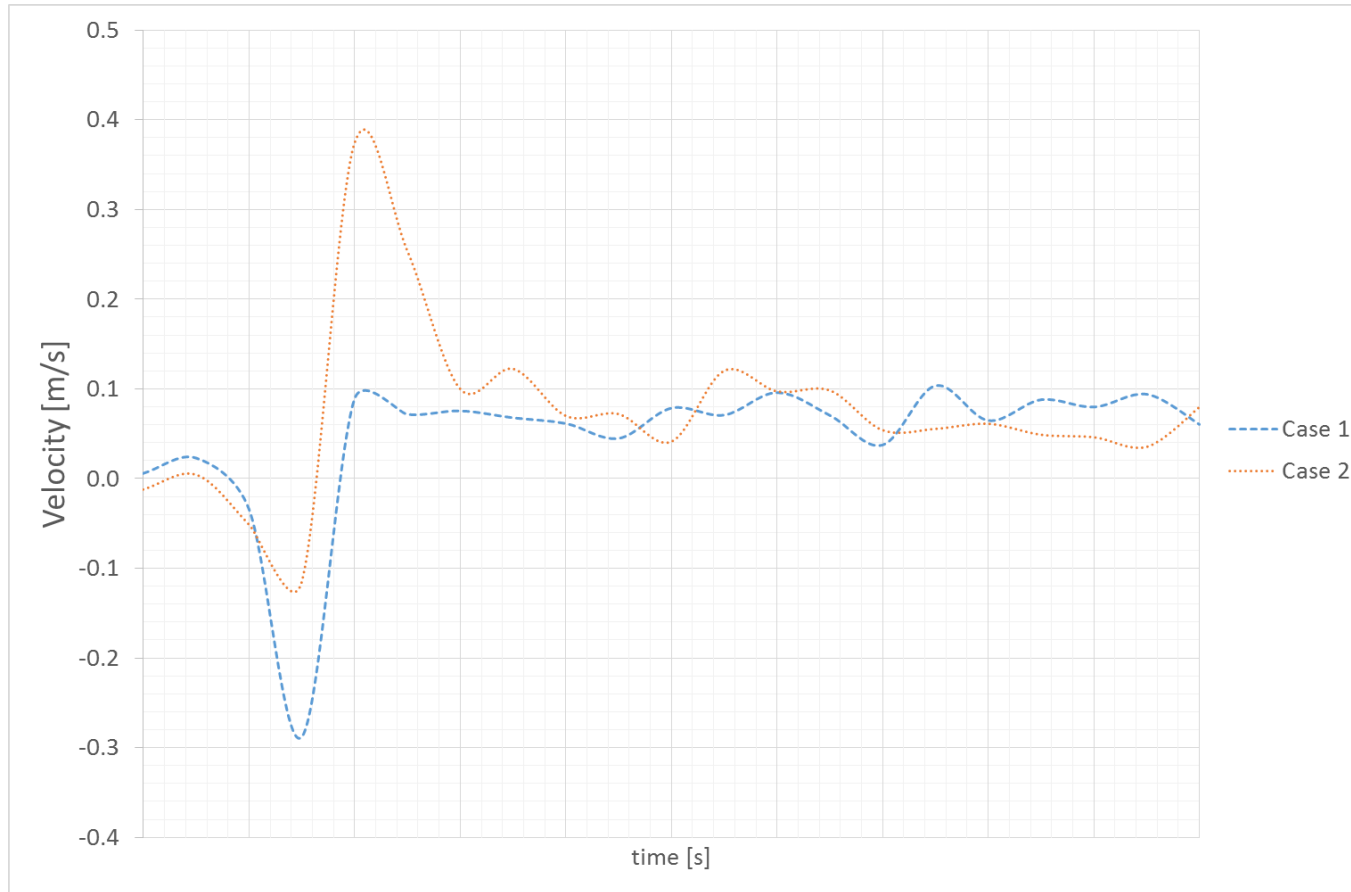


RESULTS



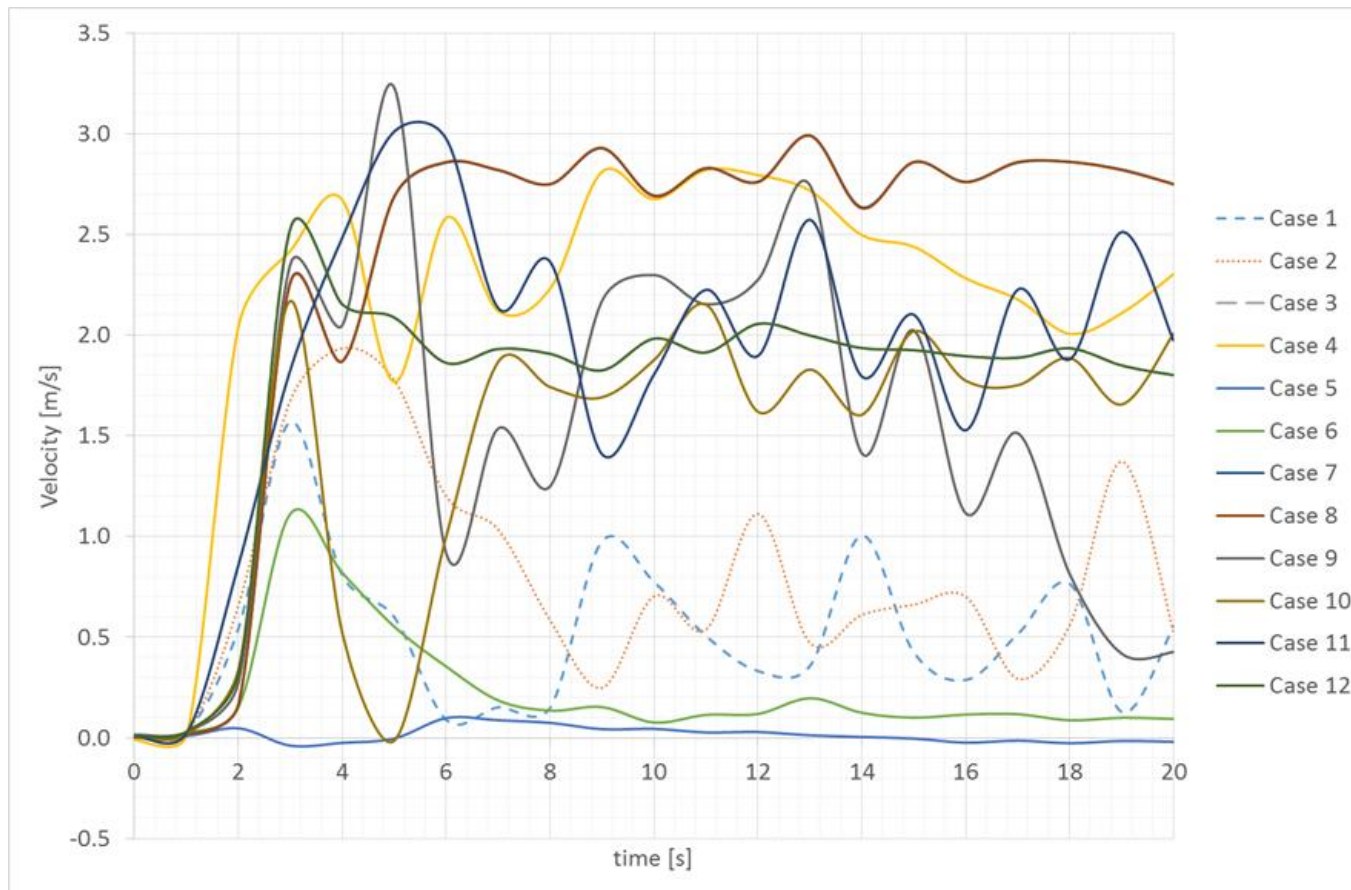
u-velocity for a point located 1.5 m AFL

RESULTS



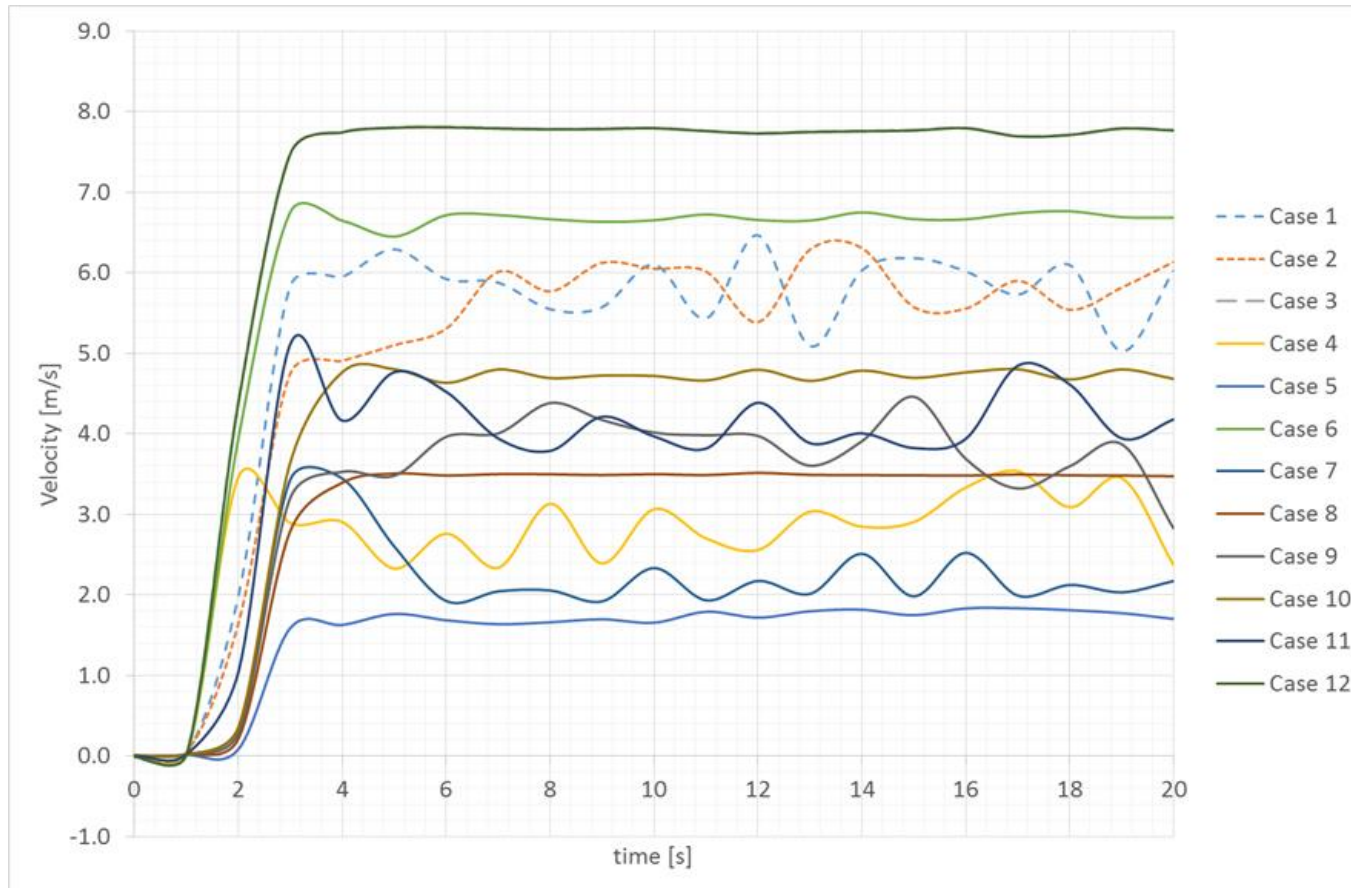
u-velocity for a point located 1.5 m AFL

RESULTS



u-velocity for a point located 2.0 m AFL

RESULTS



u-velocity for a point located 2.5 m AFL

RESULTS

Case #	Cell Number	Time [min]
1	8,009,280	2501
2	1,749,600	328
3	296,640	119
4	488,220	440
5	182,046	93
6	145,230	107
7	145,230	37
8	37,080	8
9	139,050	46
10	74,160	22
11	244,110	141
12	296,640	50

Thank you for attending

Contact me at :

sam.alshroof@olssonfire.com

+61 4 28 550 874

www.olssonfire.com