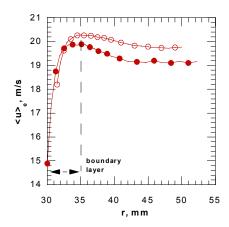
Tunnel Co-Flow

The profile of secondary axial velocity, U_e , in the wind tunnel was measured using LDV and by hot wire. From this data, the boundary layer on the swirl burner's outer surface (radius=30mm) was found to be approximately 5mm thick.

The data is presented below with all radial distances being from the centreline of the burner (r=0mm).



Hot wire data
LDV data

Radial Pos (m/s) <u>e (m/s) u'e (m/s) Radial Pos (mm) <u>e (m/s) 30.0 14.9 3.2 31.5 18.2 30.6 17.4 2.6 32.0 19.1 31.3 18.8 2.0 32.5 19.6 31.9 19.4 1.7 33.0 20.0 32.5 19.7 1.5 33.5 20.1 33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.7 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 <</u></u>	LDV data			Hot Wir	Hot Wire data	
30.0 14.9 3.2 31.5 18.2 30.6 17.4 2.6 32.0 19.1 31.3 18.8 2.0 32.5 19.6 31.9 19.4 1.7 33.0 20.0 32.5 19.7 1.5 33.5 20.1 33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.5 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 40.8 19.3 1.3 49.0 19.9 45.9	Radial Pos	<u>e</u>	u' _e	Radial Pos	<u>>_e</u>	
30.6 17.4 2.6 32.0 19.1 31.3 18.8 2.0 32.5 19.6 31.9 19.4 1.7 33.0 20.0 32.5 19.7 1.5 33.5 20.1 33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3	(mm)	(m/s)	(m/s)	(mm)	(m/s)	
31.3 18.8 2.0 32.5 19.6 31.9 19.4 1.7 33.0 20.0 32.5 19.7 1.5 33.5 20.1 33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6	30.0	14.9	3.2	31.5	18.2	
31.9 19.4 1.7 33.0 20.0 32.5 19.7 1.5 33.5 20.1 33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.8 45.9	30.6	17.4	2.6	32.0	19.1	
32.5 19.7 1.5 33.5 20.1 33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1	31.3	18.8	2.0	32.5	19.6	
33.2 19.9 1.4 34.0 20.2 33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0	31.9	19.4	1.7	33.0	20.0	
33.8 19.9 1.3 34.5 20.3 34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0	32.5	19.7	1.5	33.5	20.1	
34.4 19.8 1.3 35.0 20.3 35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2	33.2	19.9	1.4	34.0	20.2	
35.1 19.9 1.3 35.5 20.3 35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2	33.8	19.9	1.3	34.5	20.3	
35.7 19.9 1.3 36.0 20.3 36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2	34.4	19.8	1.3	35.0	20.3	
36.4 19.8 1.3 36.5 20.2 37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0	35.1	19.9	1.3	35.5	20.3	
37.0 19.7 1.3 37.0 20.2 37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	35.7	19.9	1.3	36.0	20.3	
37.6 19.6 1.3 37.5 20.2 38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	36.4	19.8	1.3	36.5	20.2	
38.3 19.6 1.3 38.0 20.2 38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	37.0	19.7	1.3	37.0	20.2	
38.9 19.5 1.3 38.5 20.2 39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	37.6	19.6	1.3	37.5	20.2	
39.5 19.4 1.3 39.0 20.1 40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	38.3	19.6	1.3	38.0	20.2	
40.8 19.3 1.3 39.5 20.1 42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	38.9	19.5	1.3	38.5	20.2	
42.1 19.2 1.4 40.0 20.0 43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	39.5	19.4	1.3	39.0	20.1	
43.3 19.2 1.3 41.0 20.0 44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	40.8	19.3	1.3	39.5	20.1	
44.6 19.1 1.3 42.0 19.9 45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	42.1	19.2	1.4	40.0	20.0	
45.9 19.2 1.3 43.0 19.8 47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	43.3	19.2	1.3	41.0	20.0	
47.1 19.1 1.3 44.0 19.8 48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	44.6	19.1	1.3	42.0	19.9	
48.4 19.1 1.2 45.0 19.8 49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	45.9	19.2	1.3	43.0	19.8	
49.7 19.2 1.2 46.0 19.8 51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	47.1	19.1	1.3	44.0	19.8	
51.0 19.1 1.2 47.0 19.8 52.2 19.2 1.1 48.0 19.7 49.0 19.8	48.4	19.1	1.2	45.0	19.8	
52.2 19.2 1.1 48.0 19.7 49.0 19.8	49.7	19.2	1.2	46.0	19.8	
49.0 19.8	51.0	19.1	1.2	47.0	19.8	
	52.2	19.2	1.1	48.0	19.7	
50.0 19.8				49.0	19.8	
				50.0	19.8	