CASE STUDY

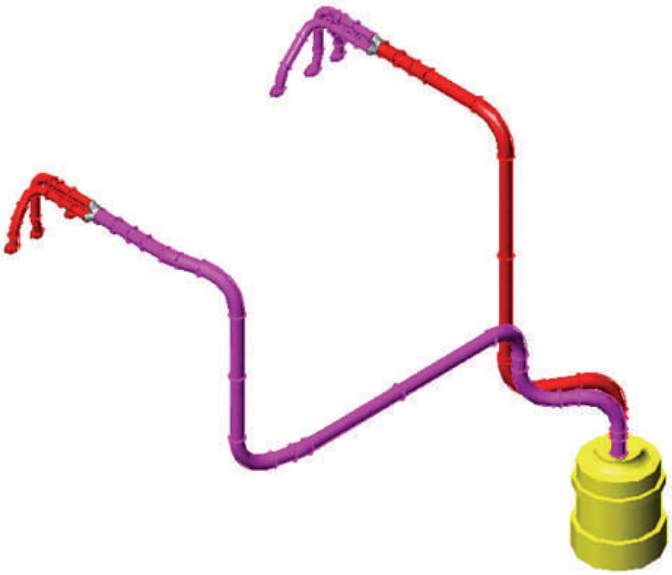
H-VARB PF Diffuser at Didcot Power Station, UK

Background.

In the summer of 2005, Didcot power station in Oxfordshire, UK requested 4 H-VARB's for their G and E mills for unit 2. Greenbank supplied 4 x VARB's, 4 x Control Gates and the associated pipework to Didcot Power Station.

To enhance this test, a control gate with three blades was installed downstream of each H-VARB. The idea of this was to add a facility for fine tuning so that the distribution can be improved or controlled.

Didcot also purchased a PfMaster Coal Flow Monitoring System so that the PF distribution could be properly monitored on line before and after the installation of the H-VARB's.



Configuration of G-Mill

Installation and Operation:

The Control Gate and H-VARB were installed directly in front of the existing 3-way Trifurcator.

The position and orientation of the H-VARB is critical for its performance. The principle of the H-VARB is to lift the rope away from the pipe wall and in turn, fan it out into a turbulent void. In order to do this, prior distribution results need to be analysed and a CFD study engineered and completed to replicate the existing conditions. When this is achieved, only then can the position of the rope be identified.

Should the H-VARB be placed right after a bend or elbow the position of the rope is obvious. However, if the position of the H-VARB is somewhere along a straight pipe section the position and the profile of the H-VARB needs further CFD design input.

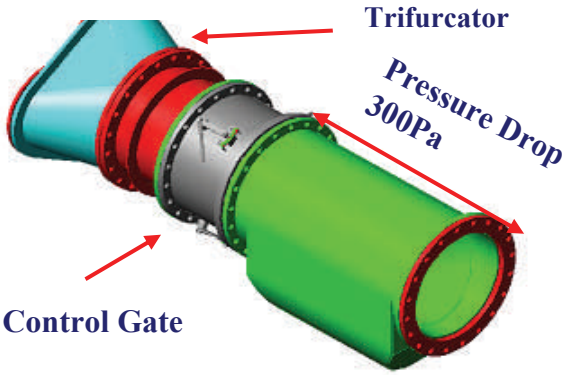
The control gate is positioned strategically at the correct distance from the H-VARB so that the flow into each splitter leg can be finely trimmed. It is also designed so that the air pressure is rebalanced after the diverter blades so only particulates are diverted and not air. The degree of movement of the blades is limited to +/-15° from zero.

Configuration of E-Mill

Outline Performance Data.

- Air to Fuel Ratio: 2.6 to 3.4:1 , Velocity: 21-25.4m/s, Coal Type: Black (Varies)
- Pipe Inlet Diameter: 660NB (26"), Pipe Outlet Diameter: 380NB (15")
- Pipe Linings: Alumina & Basalt

VARB Arrangement:



H-VARB and Control Gate

Results: Control Gates Set at Zero Degrees, PfMaster readings

The results outlined below show the pulverised fuel split after the H-VARB was fitted.

% Distribution: Which is a percentage of the total mass flow.

% Deviation: Which is the percentage deviation from the required ideal split (in this case 16.663%.)

	G1	G2	G3	G10	G11	G12
Distribution (%)	16%	13%	16%	19%	19%	17%
Deviation (%)	-0.23%	-3.55%	-0.62%	2.27%	2.13%	0.00%

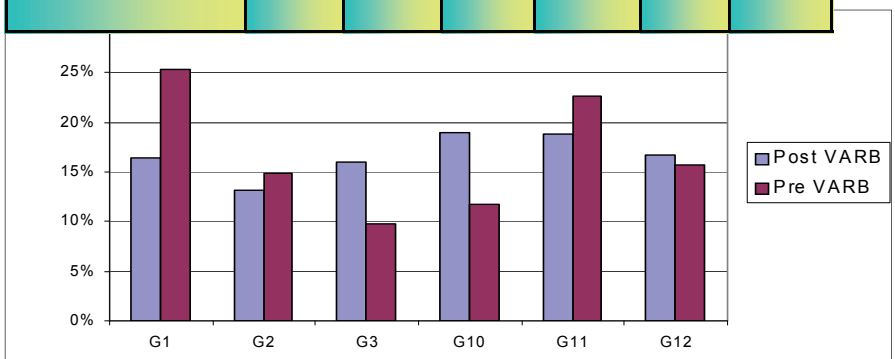
Results: Previous multi-point sampling method.

The results outlined below show before the installation of the H-VARB:

% Distribution: Which is a percentage of the total mass flow.

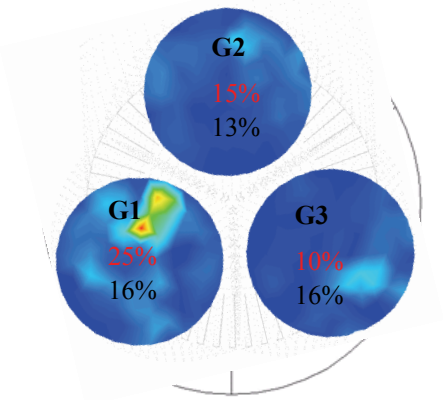
% Deviation: Which is the percentage deviation from the required ideal split (in this case 16.66%.)

	G1	G2	G3	G10	G11	G12
Distribution (%)	25%	15%	10%	12%	23%	16%
Deviation (%)	8.68%	-1.77%	-	-4.92%	5.93%	-1.02%



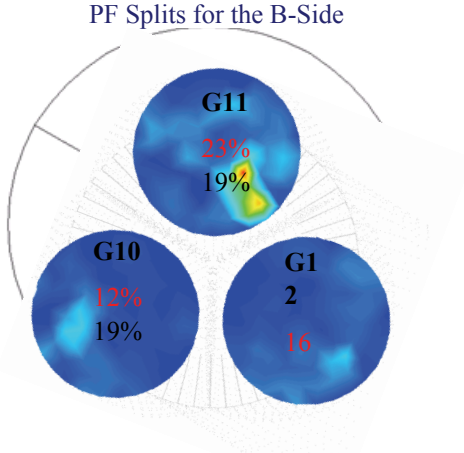
A chart comparing the distribution across G-Mill for the 6 Outlets pre-VARB and post-VARB

PF Splits for the A-Side

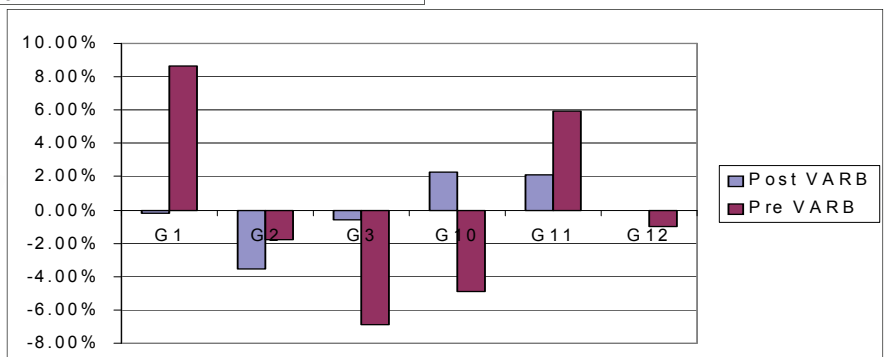


Splits before in red, splits after in black

PF Splits for the B-Side



Splits before in red, splits after in black



A chart comparing the deviation from the ideal split on G-Mill, post VARB and pre VARB.

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