

REFERENCES

- [1] Sri Lanka Sustainable Energy Authority ‘‘Sri Lanka Energy Balance 2007 and Analysis of Energy Sector Performance’’, Chapter 5, 2017
- [2] Training Workshop on Biomass to Energy in Industrial Applications Organized by Sri Lanka Sustainable Energy Authority Funded by United Nations Development Project, 2015.
- [3] Fournel, S., Palacios, J.H., Morrissette, R., Villeneuve, J., Godbout, S., Heitz, M., and Savoie, ‘‘ Influence of biomass properties on technical and environmental performance of a multi-fuel boiler during on-farm combustion of energy crops’’, *Applied energy*, 141, 2015, pp. 247-259
- [4] Johansson, T.B.; Kelly, H.; Reddy, A.K.N.; Williams, R.H. Renewables for fuels and electricity, 1992, UNCED.
- [5] K. Milieuonderzoek, et al, ‘‘ Review of applications of gases from biomass gasification- ECN Biomass’’, 2006.
- [6] R. Budhathoki, ‘‘Three zone modeling of Downdraft biomass Gasification: Equilibrium and finite Kinetic Approach’’, 2013.
- [7] P. Basu, *Biomass Gasification and Pyrolysis*, 1st Ed.
- [8] Available: <http://www.bios-bioenergy.at/en/electricity-from-biomass/biomass-gasification.html> accessed on 22/ 11/2016
- [9] Available: <http://biofuelsacademy.org/web-modules/process/gasification/cross-draft-gasification/> accessed on 22/ 11/2016
- [10] A. Z. Mendiburu, et al, ‘‘ Thermochemical equilibrium modelling of a biomass downdraft gasifier: Constrained and unconstrained non-stoichiometric models’’, *Energy*, xxx, 2014, pp. 1-14.
- [11] A. Z. Mendiburu et al, ‘‘ Thermochemical equilibrium modeling of biomass downdraft gasifier: Stoichiometric models’’, *Energy* xxx, 2014, pp. 1 – 14.
- [12] T. K. Patra and P. N. Sheth, ‘‘Biomass gasification models for downdraft gasifier: A state-of-the-art review’’, *Renewable and Sustainable Energy Reviews*, 50, 2015, pp. 583–593.

- [13] P. N. Sheth and B.V. Babu, ‘‘ Experimental studies on producer gas generation from wood waste in a downdraft biomass gasifier’’, *Bio resource Technology*, 100, 2009, pp.3127–3133.
- [14] V. V. N. Kishore, *Renewable Energy Engineering and Technology: Principles and practice*.
- [15] *Handbook of biomass downdraft gasifire system*, 1988.
- [16] N. S. Barman et al, ‘‘Gasification of biomass in a fixed bed downdraft gasifier – A realistic model including tar’’, *Bio resource Technology*, 107, 2012, PP. 505–511.
- [17] H. Ghassemi and R. Shahsavan - Markadeh, ‘‘Effects of various operational parameters on biomass gasification process; a modified equilibrium model’’, *Energy Conversion and Management*, 79, 2014, pp. 18–24.
- [18] L. E. Taba et al, ‘‘The effect of temperature on various parameters in coal, biomass and CO-gasification: A review’’ *Renewable and Sustainable Energy Reviews*, 16, 2012, pp. 5584–5596.
- [19] R. Mikulandric et al, ‘‘ Process performance improvement in a co-current, fixed bed biomass gasification facility by control system modifications’’ *Energy Conversion and Management*, 104, 2015, pp. 135–146.
- [20] A. Z. Mendiburu et al, Thermochemical equilibrium modeling of a biomass downdraft gasifier: Constrained and unconstrained non-stoichiometric models, *Energy xxx*, 2014, pp. 1-14.
- [21] A. Z. Mendiburu et al, ‘‘Thermochemical equilibrium modeling of biomass downdraft gasifier: Stoichiometric models’’, *Energy* 66, 2014, pp.189 – 201.
- [22] O. Yucel, and M.A. Hastaoglu, ‘‘Kinetic modeling and simulation of throated downdraft gasifier’’ *Fuel Processing Technology*, 144, 2016, pp.145–154.
- [23] Bing Guo et al, ‘‘Simulation of biomass gasification with a hybrid neural network Model’’ *Bio resource Technology*, 76, 2001, pp. 77-83.
- [24] Robert Mikulandric et al, ‘‘Artificial neural network modelling approach for a biomass gasification process in fixed bed gasifiers’’ *Energy Conversion and Management*, xxx, 2014, pp. xxx–xxx.

- [25] M. Puig-Arnavat et al, "Artificial neural network models for biomass gasification in fluidized bed gasifiers", *Biomass and bioenergy*, 49, 2013, pp. 279-289.
- [26] T. Y. Ahmed et al, "Mathematical and computational approaches for design of biomass gasification for hydrogen production: A review" *Renewable and Sustainable Energy Reviews*, 16, 2012, pp. 2304– 2315.
- [27] R. Piloto-Rodríguez et al, "Prediction of the cetane number of biodiesel using artificial neural networks and multiple linear regression" *Energy Conversion and Management*, 65, 2013, pp. 255–261.
- [28] S. Mohanty, " Artificial neural network based system identification and model predictive control of a flotation column", *Journal of Process Control*, 19, 2009, pp. 991–999.
- [29] J. C. Macmurray and D. M. Himmelbeal, " Modeling and Control of A Packed Distillation Column Using Artificial Neural Networks", *Computers chem. Engng*, 19(10) 1995, pp.1077-1088.
- [30] C. Di Blasi, " Dynamic behaviour of stratified downdraft gasifiers" *Chemical Engineering Science*, 55, 2000, pp. 2931-2944.
- [31] J.J. Hernández et al, " Characterisation of tars from biomass gasification: Effect of the operating conditions" *Energy* 50, 2013, pp. 333-342.
- [32] F. S. Mjalli, et al, "Use of artificial neural network black-box modeling for the prediction of wastewater treatment plants performance", *Journal of Environmental Management*, 83, 2007, pp.329–338.
- [33] K.J. Hunt, and D. Sbarbaro, "Neural networks for nonlinear internal model control", *IEE Proc.-D*, 138(5), 1991.
- [34] K. J. Hunt et al, "Neural Networks for Control Systems Survey" *1992 International Federation of Automatic Control Automatica*, 28 (6), 1992, pp. 1083-1112.
- [35] *Matlab NN Tool Box User Guide*.
- [36] M. T. Hagan and H. B. Demuth, "Neural Networks for Control" *Proc. American Control Conference*, San Diego: California, 1999.

- [37] T. L. Fine, "Feed Forward Neural Network Methodology", New York, Springer, 1999.
- [38] B.G. Horne, and C.L. Giles, " An Experimental Comparison of Recurrent Neural Network", 1995, pp.697.
- [39] J. M. Caswell, " A Nonlinear Autoregressive Approach to Statistical Prediction of Disturbance Storm Time Geomagnetic Fluctuations Using Solar Data" *Journal of Signal and Information Processing*, 5, 2014, pp. 42-53.
- [40] G. Mustafaraj, et al, "Prediction of room temperature and relative humidity by autoregressive linear and nonlinear neural network models for an open office" *Energy and Buildings*, 43,2011, pp. 1452–1460.

ANNEXES

Appendix 1

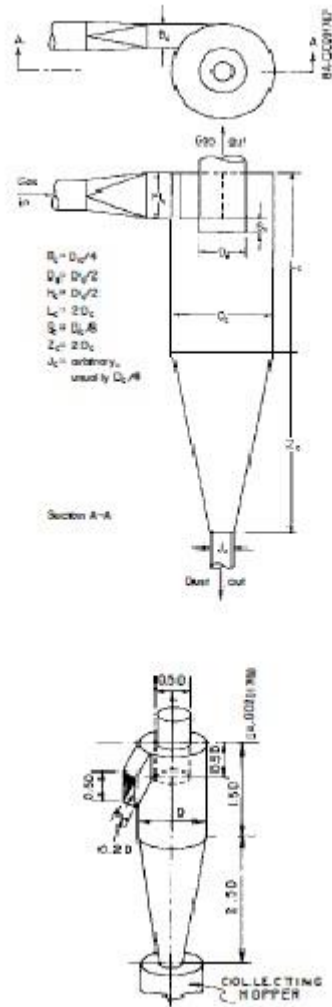


Figure 1.a: Proportions of a High Efficiency Cyclone [15]

Appendix 2

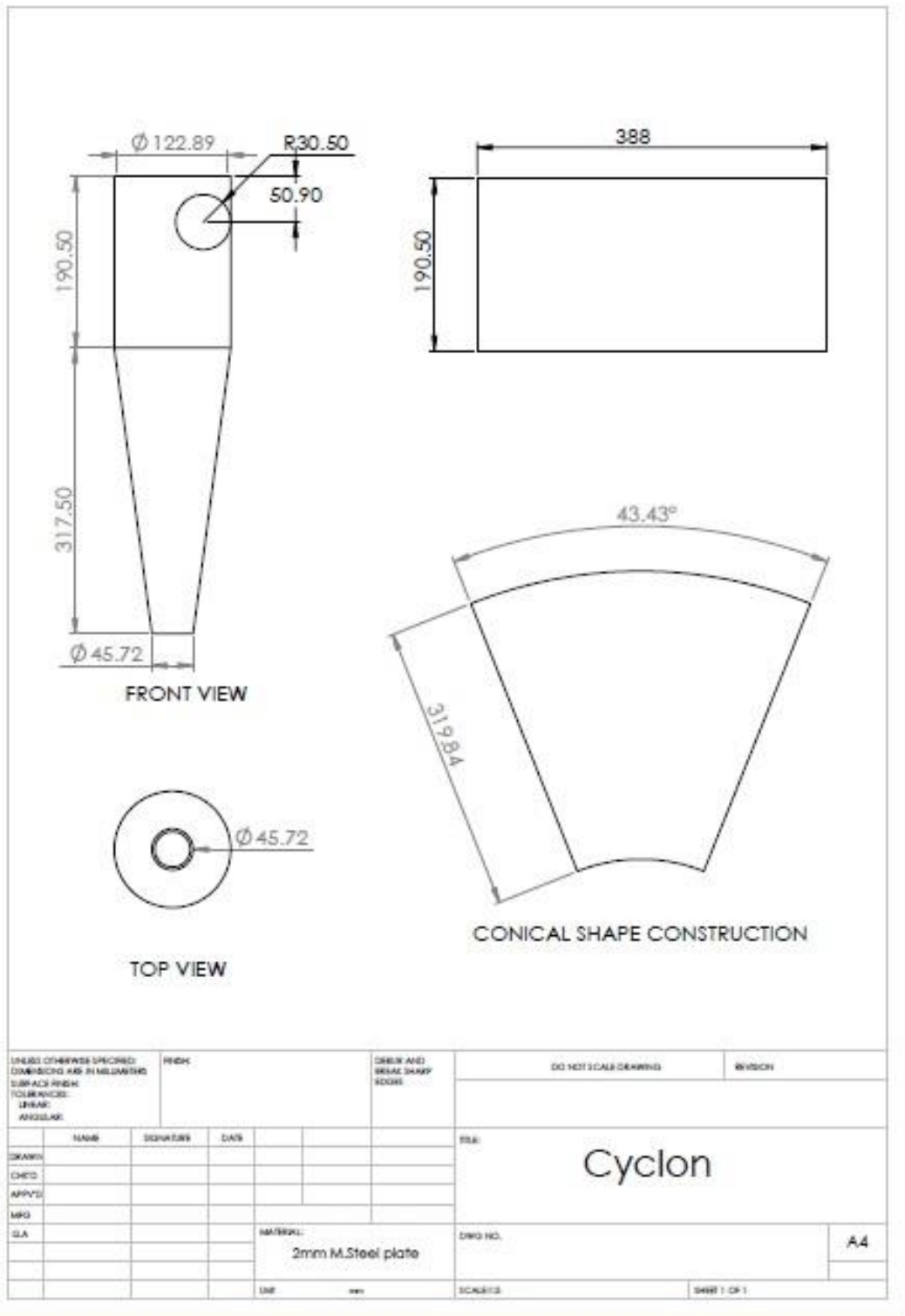


Figure 2.a: Engineering Drawing of Cyclone Construction

Appendix 3

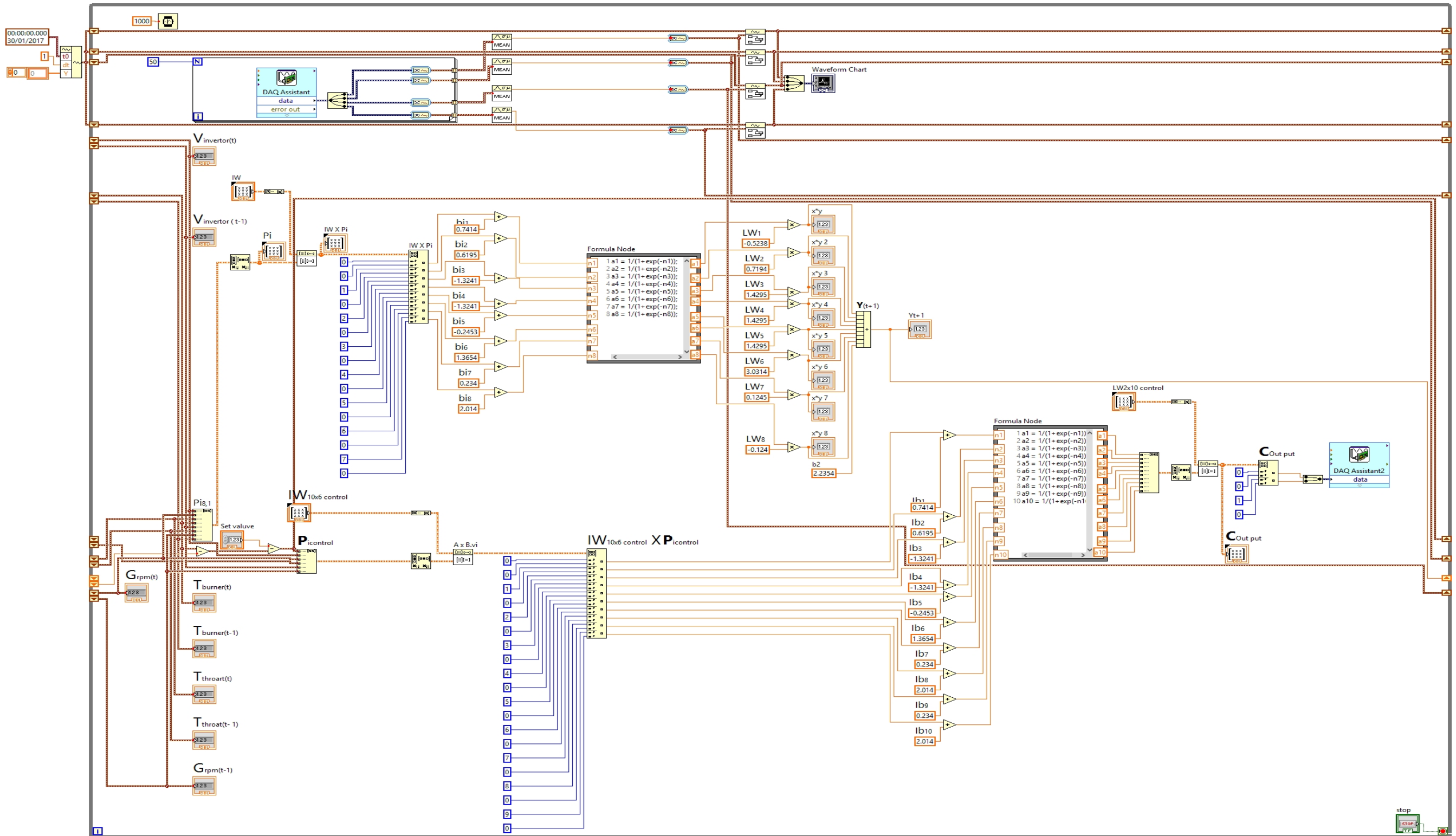


Figure 3.a: LABVIEW Block Diagram