

## Curriculum Vitae – Dr. PETER W. REIN

### Business Address:

Audubon Sugar Institute  
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### 1. University degrees

- B.S., Chemical Engineering with 1<sup>st</sup> Class Honors, University of Cape Town, South Africa, 1965
- M.S., Chemical Engineering, University of Cape Town, South Africa, 1967
- Ph.D., Chemical Engineering, University of Natal, South Africa, 1973

### 2. Professional experience

- a) September 1967 to March 1969 - Adamant Research Laboratory De Beers Diamond Division, Johannesburg. Employed to fulfil a bursary contract obligation. Research into manufacture of synthetic diamonds.
- b) April 1969 to August 1971 - Hulett's Sugar Limited. Employed in Research & Development Department while undertaking research for a Ph.D. degree.
- c) August 1971 to February 1974 - Operations Research Department of Hulett's Sugar Limited. Process modelling and simulation and economic feasibility studies.
- d) March 1974 to March 1976 - Technical Management Department of Hulett's Sugar Limited. Employed as Process Control Engineer to supervise and co-ordinate instrumentation/automation systems in 5 Hulett's Sugar Mills and Hulett's Refinery.
- e) April 1976 to February 1978 - Hulett's Sugar Mill at Amatikulu. Seconded to Amatikulu in specially created position of Operations Engineer in charge of production, following a major expansion at Amatikulu Mill.
- f) February 1978 to May 1979 - Chief Development Officer of Hulett's Sugar Research & Development Department. Reporting to the R & D Manager, this position carried responsibility for all development work undertaken at Hulett's Mills.

- g) From June 1979 to November 1992 - Consulting Technologist in the Technical Management Department of Tongaat-Hulett Sugar Limited. Chief consultant on sugar processing for Tongaat-Hulett Mills and Huletts Refinery and responsible for all process design at the new Felixton Sugar Mill. Following a re-organisation, the position expanded to encompass all technology development, incorporating the Tongaat-Hulett Research & Development Department (scaled down in size).
- h) December 1992 to January 2000 - Technical Director, Tongaat-Hulett Sugar Ltd. Overall responsibility for the optimum use and development of technical resources of the Company. This included strategic planning of technology development, planning and implementation of productivity improvement and capacity expansion efforts, and control of R & D throughout the Company.
- i) February 2000 to March 2007 – Professor and Head of the Audubon Sugar Institute, Louisiana State University, Baton Rouge, USA. Principal investigator for US DOE funded project on sugarcane biorefinery (\$4 million). History of grant funding at LSU attached.
- j) March 2007 to present – part-time professor, Louisiana State University, and consultant to the international sugar industry

### 3. **Previous South African Sugar Industry Positions:**

- Director on Board of South African Sugar Millers' Association.
- Vice-Chairman Sugar Milling Research Institute Board of Control.
- Chairman South African Industrial Training Centre Committee.
- Executive Committee of South African Sugar Association Experiment Station.

### 4. **Consulting work:**

Consulting has included equipment design, optimization, design review, equipment selection, expansion and refurbishment studies, process audits, technical due diligence studies, energy efficiency, training, education, R + D, industry assessments; in cane sugar processing, refining and by-product exploitation. Since 2000, consulting clients have included:

- Imperial Bioresources, Brawley, California
- F.C. Schaffer & Assoc., Baton Rouge
- PGBI Engineers and Constructors, South Africa
- Cargill Foods, Dayton, Ohio
- Tongaat-Hulett Sugar, South Africa
- Philippines Sugar Industry
- Andhra Sugars, India
- South African Cane Sugar Growers Association
- LMC International
- United States Sugar Corp., Florida
- Booker Tate, England
- Cenicana Research Institute, Colombia
- Sugar Technology International, Texas
- EID Parry, India
- Suiker Unie, Holland

## 5. Professional registration

Chartered Engineer (U.K.)

Professional Engineer (South Africa)

## 6. Membership of scientific and professional societies

- Member of Institution of Chemical Engineers (London).
- Fellow of South African Institution of Chemical Engineers.
- Member of South African Sugar Technologists' Association.
- Honorary Life Member, International Society of Sugar Cane Technologists
- Member of Sugar Industry Technologists Inc.
- Member American Society of Sugar Cane Technologists
- Member American Institute of Chemical Engineers

## 7. Publications:

### (a) *Books*

- New book "Cane Sugar Engineering", commissioned by German publisher, Bartens. Published February 2007, 768 pages [www.canesugarengineering.com](http://www.canesugarengineering.com)
- Chapter 5. Environmental parameters. Co-authors B.A.Prior and J.C. du Preez, in "Solid Substrate Cultivation". Ed. H.W.Doelle, D.A.Mitchell and C.E.Rolz, Elsevier (1992).
- Chapter on Cane Diffusion, in "Sugar Technology" Ed. van der Poel, Schiweck and Schwartz, Bartens (1998).
- Chapter on Carbonatation in "Handbook of Sugar Refining: A Manual for the Design and Operation of Sugar Refining Facilities", Ed. C.C.Chou, John Wiley (2000).
- International Commission on Uniform Methods of Sugar Analysis Methods Book - Methods for wet disintegrator, cane preparation and moisture in bagasse analysis. TV Dutton (Ed) (1994).

### (b) *Recent Papers (refereed)*

- Echeverri L. F.; **Rein P. W.**; Acharya S. (2007): Numerical analysis of the hydraulic design of sugar evaporating crystallizers (vacuum pans). Zuckerindustrie. 132, 12,.
- Echeverri L.F.; **Rein P.W.** (2007): Numerical study of the flow in air flotation syrup clarifiers. Int. Sugar J. 109, 1302, 372-378.
- **Rein P.W.** (2007): Developments in sugarcane processing over the last 25 years. Zuckerindustrie. 132, 6, 435-444.
- Echeverri L. F.; **Rein P. W.**; Acharya S. (2007): Measurements and CFD simulation of the flow in vacuum pans. Proc. Int. Soc. Sugar Cane Technol. 26, 1341-1353.
- **Rein P.W.** (2007): Prospects for the conversion of a sugar mill into a biorefinery. Proc. Int. Soc. Sugar Cane Technol. 26, 44-60.
- **Rein P.W.** (2007): Developments in Sugarcane Processing over the Last 25 Years. Paper presented to the 23<sup>rd</sup> General assembly of CITS, Rostock Germany, May 2007
- **Rein P.W.**; Bento L.S.M.; Cortes R. (2007): The direct production of white sugar in a cane sugar mill. Int. Sugar J. 109, 1301, 286-299.

- **Rein P.W.** (2006): Some fundamental considerations of crystallization and their implications for the control of sugar boiling. *Sugar Ind. Technol.* 65, 77-89.
- Bento L; **Rein P**; Sabliov C.; Boldor D.; Coronel P. (2006): C Masecuite Re-Heating Using Microwaves. *J. Amer. Soc. Sugar Cane Technol.* 26, 1-13.
- Solberg D.; **Rein P.W.**; Schlorke D. (2006): Online evaporator heat transfer measurement and analysis. *Int. Sugar J.* 108, 1285, 28-38.
- Echeverri L.F.; **Rein P.W.**; Acharya S. (2005): Numerical and experimental study of the flow in evaporating crystallizers. *Zuckerindustrie* 130, 538-544.
- **P. W. Rein**; D. J. Muzzell; N. Dolan (2005): The Use of a Coriolis Flow Meter for Measuring Molasses Production in a Sugar Mill. *J. Amer. Soc. Sugar Cane Technol.* 25, 129-142
- Martins, P. M.; Rocha, F. A.; **Rein, P.** (2005): Modeling Sucrose Evaporative Crystallization. Part 1. Vacuum Pan Monitoring by Mass Balance and Image Analysis Methods. *Ind. Eng. Chem. Res.* 44, (23), 8858-8864.
- Martins, P. M.; Rocha, F. A.; **Rein, P.** (2005): Modeling Sucrose Evaporative Crystallization. Part 2. Investigation into Crystal Growth Kinetics and Solubility. *Ind. Eng. Chem. Res.* 44, (23), 8865-8872.
- **Rein P.W.** (2005): The effect of green cane harvesting on a sugar mill. *Proc. Int. Soc. Sugar Cane Technol.* 25, 513-520.
- Echeverri L.F.; **Rein P.W.**; Acharya S. (2005): Numerical and experimental study of the flow in vacuum pans. *Proc. Int. Soc. Sugar Cane Technol.* 25, 513-520.
- **Rein, P.W.**, Echeverri L. and Acharya S. (2003). Circulation in vacuum pans. *J. Am. Soc. of Sugar Cane Tech.* 24, 1-17.
- Broadhurst, H. A. and **Rein, P.W.** (2002). Modeling Adsorption of Cane Sugar Solution Colorant in Packed-bed Ion Exchange. *Am. Inst. Chem. Eng. J.* 49, 10, 2519-2532.
- Broadhurst, H.A., and **Rein, P.W.** (2003). Deconvolution of GPC chromatograms of sugar solutions. *Zuckerindustrie* 127, 3, 96-99.
- **Rein, P.W.** (2003). Education and Training at the Audubon Sugar Institute. *Int. Sugar J.* 105, 1249, 20.
- **Rein, P.W.** (2001). Design of Sugar Factory Equipment to Reduce Losses. *Proc. Int. Soc. Sugar Cane Technol.* 24, 404.
- **Rein, P.W.** (2001). Strategies for the expansion of cane sugar mills. *J. Am. Soc. Sugar Cane Tech.* 21, 92–101.
- **Rein, P.W.** (2000). A review of extraction of sugar from cane by diffusion. *Proc. Combined Conf. Central Am., Latin Am. and Caribbean Sugar Technol. Assoc.* in press.
- **Rein, P.W.** and Msimanga, M.P. (1999). A review of continuous pan development in the Southern African sugar industry. *Zuckerindustrie.* 124: no 6, 462-427.
- **Rein, P.W.** (1999). A review of cane diffusion in South African sugar mills. *Int. Sugar J.* 101: 1204E, 192.

**(c) Patents**

Holder of patents in the area of continuous vacuum pans, syrup clarification, and sugar refining.

**(d) *Invited lectures***

- Keynote speaker, plenary session, C.I.T.S. Germany, May 2007
- Invited speaker, 50<sup>th</sup> Anniversary of the Mauritius Sugar Industry Research Institute, October 2003.
- Diversificación de la Producción Azucarera en el Mundo”, in del Foro Nacional sobre el Futuro de la Industria de la Cana de Azúcar, Córdoba México, February 2002
- Plenary lecture, American Society of Sugar Cane Technologists, Louisiana division, February 2001
- Plenary lecture to combined conference of Asociación de técnicos de Centroamérica, Asociación de Técnicos Azucareros de Costa Rica and Asociación de técnicos Azucareros de Latinoamérica y el Caribe, Costa Rica, September 2000
- Gundu Rao Memorial Lecture to Sugar Technologists Society of India (1998) on Developments in the South African sugar industry, Shimla, India.

**8. Awards and Honors**

- Awarded Douglas Niland Malan medal for the most distinguished graduate in chemical engineering, University of Cape Town, 1965
- Awarded University Council Scholarship for Best Student in all branches of engineering, University of Cape Town, 1966-1967
- Part of team awarded South African Institute of Mechanical Engineers Projects and Systems Award 1985 for Felixton II Sugar Mill Project.
- Leader of team awarded South African Institution of Chemical Engineers Innovation Award 1993, for Continuous Pan Development.
- South African Associated Scientific and Technical Societies National Award for Continuous Vacuum Pan Crystallisers.
- Sugar Industry Technologists (New York) Sugar Crystal Award 1997 for achievement in sugar technology.
- First recipient of Sugar Processing Research Institute (New Orleans) Technology Award 1998 for outstanding contribution to sugar processing and technology.
- Gold Medal of the South African Sugar Cane Technologists Association, presented in August 2000.
- Elected Honorary Life Member International Society of Sugar Cane Technologists, February 2005.

**9. Institutional and professional service**

- Member of South African Sugar Technologists' Association. Elected to Council of SASTA in 1982, Vice-President from 1987 to 1989 and President from 1990 - 1994.
- Elected to Executive Council - International Society of Sugar Cane Technologists 1992. Elected Vice-Chairman in 1995, and served as Chairman from 1999 to 2001. Member of Executive Committee 1992-2005.
- Board member, Sugar Processing Research Institute Inc., New Orleans, 2001-2005.
- Member of Board and Executive Committee (1994-1999) of Sugar Industry Technologists Inc.

## HISTORY OF GRANT SUPPORT

**Grants awarded where Dr Peter W Rein was the PI (Principal Investigator).  
Audubon Sugar Institute.  
Louisiana State University AgCenter**

<b>Source of Support</b>	<b>Project Title &amp; Identifying Number</b>	<b>Award Amount (or Annual Rate)</b>	<b>Period Covered by Award</b>
Organic Fuels, Houston, TX. (In Co-operation with Univ. Texas, Austin)	Electroporation and Ethanol Production	\$ 20,000	09/01/06 –28/02/07
USDA (In Co-operation with Frank Martin Farms, La)	Conversion of Sugar Cane Field Waste and Bagasse to Alcohol for Vehicle Fuels	\$ 30,000	10/01/06 – 12/31/07
Louisiana Board of Regents	Study of High-Molecular Weight Compounds using Evaporative Light Scattering Detector – LEQSF(2005-06)-ENH-TR-07	\$ 19,750	06/01/05 – 06/30/07
Louisiana Board of Regents	Simultaneous Multiwavelength Diode Array UV-vis Spectroscopy – LEQSF(2004-05)-ENH-TR-10	\$ 31,740	06/01/04 – 12/31/06
Louisiana Board of Regents (Co-PI Dr R Strongin, LSU)	Removal of Color in Sugar Processing for the Direct Production of White Sugar – LEQSF (2004-07)-RD-B-002	\$ 164,000	06/01/04 – 05/31/07
Louisiana Board of Regents (Co-PI Dr S Acharya, LSU)	Optimization of Crystallization in Vacuum Pans – LEQSF(2004-07)-RD-B-001.	\$ 196,000	06/01/04 – 05/31/07
US Dept of Energy	Sugar-based Ethanol Biorefinery: Ethanol, Succinic Acid and Byproduct Production.	\$ 2,479,000	07/01/05 – 06/30/07
US Dept of Energy	Improved Biorefinery for the Production of Ethanol, Chemicals, Animal Feed ad Biomaterials from Sugar Cane.	\$ 1,481,250	07/01/04 – 06/30/07
American Sugar Cane League	Unrestricted Research Funding	\$ 195,000	02/01/06 – 01/31/07
American Sugar Cane League	Evaluation of Cane Yard Storage Losses	\$ 9,000	02/01/06 – 01/31/07
American Sugar Cane League	NIR Measurements for Factory Control in the Louisiana Industry	\$ 6,000	02/01/06 – 01/31/07
Lockwood Greene Engineers	Evaluation of US Sugar Factory Expansion Plan	\$21,450	2005
American Sugar Cane League	Effects of Starch on Massecuite Viscosity	\$5,000	2005/06
American Sugar Cane League	Direct Production of Direct Consumption White Sugar	\$9,000	2005/06
American Sugar Cane League	Unrestricted Research Funding	\$240,000	2005-06

Cargill Inc.	Match to LEQSF(2004-07)-RD-B-002	\$20,000	2004/06
American Sugar Cane League	Direct Production of White Sugar	\$18,000	2003/04
American Sugar Cane League	Assessment of Factory Losses	\$16,500	2003/04
American Sugar Cane League	Measurement for Factory Control in the La, Industry	\$8,000	2003/04
American Sugar Cane League	Unrestricted Research Funding	\$282,000	2003/04
American Sugar Cane League	Econ. Analysis of the Potential Bioplastic Production from La Sugar Industry.	\$18,000	2003/04
American Sugar Cane League	NIR Cane Analyses	\$11,000	2003/04
Calgon Corp.	Decolorization in a Simulated Moving Bed Adsorber	\$40,000	2003
American Sugar Cane League	Unrestricted Research Funding	\$257,000	2002/03
Tongaat-Hulett Sugar Ltd., South Africa	The Direct Production of White Cane Sugar	\$20,000	2001/03
La. Board of Regents	Ind. Fermentation LEQSF(2003-04)-ENH-TR-09	\$50,000	2003/04
La. Board of Regents	NIR Spectroscopy LEQSF(2002-03)-ENH-TR-09	\$52,278	2002/03
American Sugar Cane League	Unrestricted Research Funding	\$232,000	2001/02
American Sugar Cane League	Survey of Roll Shaft Breakages	\$6,000	2000/01
American Sugar Cane League	Unrestricted Research Funding	\$243,600	2000/01
American Sugar Cane League	Molasses Survey	\$12,600	2000/01
American Sugar Cane League	NIR Measurements for cane payment and factory control	\$1,000	2000
American Sugar Cane League	Unrestricted Research Funding	\$66,800	2000

HISTORY OF GRANT SUPPORT  
30 October 2006