CURRICULUM VITAE - ANTHONY MICHAEL HEARN

Full names:	Anthony Michael Hearn
Identity number:	560505 5014 089
Place of birth:	South Africa [Johannesburg]
Nationality:	South African
Date of birth:	05 May 1956

Spouse:	Barendina Isabella Hearn [nee Vermaas]
Identity number:	540221 0012 087
Place of birth:	South Africa [Springs]
Nationality:	South African
Married:	18 November 1983

Date of applicability of CV: 01 December 2011

Contact:
Mobile phone: +2782 574 2901
Office phone: +2716 454 8572
Facsimile: +2786 613 4477
e-mail: tony@shebaconsulting.co.za

ACADEMIC ACTIVITIES:

Qualifications:

• BSc(Eng)	Chemical	University of the Witwatersrand, Johannesburg, SA – 1981
• Diploma in Datametrics	OR & Statistics	University of South Africa, Pretoria, South Africa – 1986
• BCom	Com. & Finance	University of South Africa, Pretoria, South Africa – 1993
• Hons. B.(B.andA.)	Business Admin	University of Stellenbosch, Stellenbosch, South Africa - 1995
• MBA	Business Admin	University of Stellenbosch, Stellenbosch, South Africa – 1996

Professional Memberships:

• Engineering Council of South Africa	Professional Engineer(PrEng 930402)
• The Association of Energy Engineers	Certified Energy Manager (CEM 139 – certificate ID 90282)
• The Association of Energy Engineers (in conjunction with Efficiency Valuation Org.)	Certified Measurement & Verification Professional (CMVP 90140 – certificate ID 90140)
• Council of Measurement & Verification Professionals of South Africa	Member(CMVPSA/02)
• South African Institute of Chemical Engineers	Member(3796)
• Operations Research Society of South Africa	Member(614)
• Southern African Association for Energy Efficiency	Member(340)

Company Affiliations:

- The South African Association of Energy Services Companies (www.esco.org.za) — Membership no. C/67/2010

Corporate Training

• Intelligent Decision Support Systems for Process Engineers	University of Stellenbosch, Dept of Chemical Engineering - 1999
• Legal Liability for Executives	KB Consulting – 2001
• Environmental Awareness	Green Gain Consulting (Pty) Ltd – 2001
• Doctoral Research Training Programme(Initial & Advanced)	University of Stellenbosch Business School – 2006
• Hazard and Operability Study Techniques	Ishecon – 2007
• Hazard Identification & Risk Assessment (HIRA)	SA Labour Guide - 2011

Publications:

- Hearn, A.M. & Gevers, W.R. 2005. The Role of Artificial Intelligence Methods in the Demand-Side Management Activities of Dynamic Electricity Pricing. Industrial and Commercial Use of Energy Conference. Cape Town, South Africa.
- Hearn, A.M., van Rensburg, A.S.J. & Henning, J.R., 2004. "Freeze Lining" on M12: Motivation, Installation and Operation. Proceedings: Tenth International Ferroalloys Congress; INFACON X: 'Transformation through Technology'. Cape Town, South Africa.
- Roos, J.G. & Hearn, A.M. 2004. Optimising the effective use of energy in the ferroalloy industry through innovative technology. Proceedings: Tenth International Ferroalloys Congress; INFACON X: 'Transformation through Technology'. Cape Town, South Africa.
- Hearn, A.M. 2001. Artificial Intelligence Technology: Value-adding to the control of a pyrometallurgical process. 13th Annual Conference of the Southern African Institute of Management Scientists,. Stellenbosch, South Africa.
- Hearn, A.M., Dzermekjo, A,J & Lamont, P.H. 1998. "Freeze Lining" concepts for improving submerged arc furnace lining life and performance. Proceedings: Eighth International Ferroalloys Congress. Beijing, China.

CAREER:

Period: July 2007 – present

Running own company: Sheba Consulting & Aviation Services [www.shebaconsulting.co.za]

- Development and presentation of an industrial energy management training course entitled 'Energy – Making What's Available Count' focusing on the energy management and cost saving issues important to industrial consumers of electricity. Training offered in conjunction with company specialising in intelligent, real-time process control and an environmental consultancy.
- Course has been submitted for validation South African Institute of Electrical Engineers (SAIEE) for acceptance for allocation of Engineering Council of South Africa (ECSA) Continuing Professional Development (CPD) credits.
- Refer to the website www.shebaconsulting.co.za for more details.

[Client confidentiality on the following precludes client details and details of projects being published – only individual activities noted. I will approach individual clients to provide *bona fide* details if so requested.]

PROJECTS IN PROGRESS:

- Involved as a specialist in a technical evaluation of a plant for an environmental evaluation that is required for a section 24(g) application.
- Participating in environmental studies as a technical specialist for projects related to the handling and disposal of waste from an industrial process.
- Acting as technical specialist in a waste handling project for a ferroalloy producer being undertaken by environmental consultants. Consulting to waste producer and participation in design of all encompassing strategy for waste handling.
- Advising a large consumer of electricity on the operational and legal aspects for participation in the electricity demand market (DMP) in South Africa. Also advising an independent consultant on the design and development of a real-time decision-making system to monitor participation in the demand market. This real-time intelligent system is being designed such that it can be adapted to cater for the requirements imposed by the Power Conservation Program when implemented.
- Electricity adviser for a ferroalloy producer [representation on Electricity Intensive User Group of South Africa].

PROJECTS and/or ASSIGNMENTS COMPLETED:

- Performed evaluation of electricity consumption to enable compliance of large electricity consumer with the requirements of NRS048-9:2010.
- Advised a large consumer of electricity on the Eskom consultation draft rules for the ECS.
- Performed evaluation of electricity consumption to enable compliance of large electricity consumer with the requirements of NRS048-9:2010.
- Retained by Attorneys for legal proceedings resulting from industrial accident referred to below.
- Completed technical evaluation of an industrial process for use by an air quality modelling specialist to be used in an objection in terms of section 31M of the National Environmental Management Act, 1998 (Act no. 107 of 1998) and an appeal in terms of section 35 of the Environment Conservation Act, 1989 (Act no. 73 of 1989).
- Evaluated a third party offering for a thermal recovery plant from a ferroalloy process to generate electricity using an Organic Rankine Cycle. Evaluation included technical, commercial and legal aspects of third party offering.
- Conducted a baseline (reference) electricity consumption study and collation of data of a large ferroalloy producer for reference consumption [including growth planning] registration in terms of Power Conservation Program in South Africa.
- Conducted a baseline (reference) electricity consumption study and collation of data of a mining operation for reference consumption [including growth planning] registration in terms of Power Conservation Program in South Africa.
- Commented on draft rules for low power factor (LPF) charge and evaluated financial implication of the LPF charge on a large electricity consumer.

- Acted as electricity adviser for a ferroalloy producer [representation on Electricity Intensive User Group of South Africa].
- Participated in activities of Energy Intensive User Group (EIUG) workgroup in South Africa giving consideration to the provision of an enabling environment for the transparent transport of privately generated electricity on utility networks.
- Completed a plant due diligence study involving investigating all aspects of metallurgical production process for the handling of metallurgical waste [study involves investigation of plant design, plant layout, pollution control, and electrical supply (municipal supply) and tariff optimization].
- Investigated power supply from a municipal [local government] point to an established ferroalloy producer. Interaction with municipal management and electrical consultants on power supply plan for local municipality.
- Independent consultant – submerged arc furnace [operational safety & fatalities incident] investigation [investigation and certification of safe operation of rest of plant required by Department of Labour]. Acted as expert witness in Department of Labour enquiry into the accident.
- Evaluated the Technology Review for an electricity generation plant utilising waste gas for a ferroalloy producer.
- Overseeing the Environmental Impact Assessment process for a new plant [includes the reviewing of all the specialist study reports as well as the reports of the environmental consultant for all phases of the EIA process].
- Studies in respect of Notified Maximum Demand issues at multi-points of delivery for a ferroalloy plant in Gauteng.
- Investigating a gas cleaning technology that will reduce environmental impact whilst making furnace waste gas available for electricity generation [advising on energy efficiency issues].
- Investigate electricity supply issues for manganese mining in Kalahari, Northern Cape to obtain optimal layout for additional plant being investigated.
- Plant design and metallurgical process consultant for an ore sinter plant.
- Consideration of the power supply for a potential waste recovery plant in Meyerton [municipal versus Eskom].
- Member of National Electricity Response Team (NERT) in South Africa – participated on the Demand Market Participation (DMP) workgroup.
- Electricity consumption under Energy Conservation System Control and Monitoring System design – proposal in conjunction with third party. System based on utilization of dynamic demand with multi-point metering using artificial intelligence technology.
- Undertook a power optimization [power factor correction] modelling exercise for a ferroalloy producer.
- Submitted a proposal to a producer for an Advanced Process Control (APC) system based on artificial intelligence technology for a process plant. Opportunities not presently receiving attention.
- Evaluated combustion operation and associated operational issues of a Steel Belt Sintering plant. Recommendations made in respect of the optimisation of control systems including energy recovery issues in connection with the operation.
- Undertook an electricity supply agreement study for a company with multiple operating sites.
- Opinion for legal team representing individual involved in industrial incident.

Period: November 2006 – June 2007

Employer: Samancor (BHPBilliton) – Metalloys Works

Job title: Business Development Manager - Metalloys

- Identify and pursue business opportunities for reclaiming waste products emanating from the manganese alloy production process.
- Investigate optimal route for power supply to a third party – for a waste handling facility.
- Participate in deliberations of the Energy Intensive Users Group as Samancor representative.
- Refereed technical papers for and attended International Ferroalloy Congress [Infacon] in New Delhi, India.
- Functioned on BHPBilliton Processing Network leadership team.
- Member of multi-disciplinary project team investigating positioning of ferroalloy plant in various locations in the world.
- Presented a paper on environmental issues in ferroalloy production at University of the Witwatersrand, Department of Process Engineering colloquium.

Period: January 2003 – October 2006

Employer: Samancor (BHPBilliton) – Metalloys Works

Job title: Technical Manager - Metalloys

- Run the Environmental Impact Assessment process for a reclamation project at Metalloys.
- Run and co-ordinate the completion of a full energy audit of the ferroalloy operation completed under the auspices of duPont.
- Generate business case and motivate an electricity metering system for Metalloys – resulted in a comprehensive metering and electricity consumption metering system that has allowed electricity consumption allocations to individual consumers with the ferroalloy operation.
- Control the optimisation and reporting function for the electricity consumption of the entire production portfolio at Metalloys.
- Participate in deliberations of the Energy Intensive Users Group as Samancor Manganese representative.
- Liase with Eskom [RSA electricity supply utility] on electricity supply for Metalloys.
- Attended, co-authored and presented two papers at the International Ferroalloy Congress [Infacon] at Cape Town, South Africa [both had an energy optimization theme].
- Functioned on Technical Program Committee for International Ferroalloy Congress, InfaconX, 2004.
- Acted as General Manager of the ferroalloy works in the period May 2004 to April 2005.
- Paper discussing the aspects of dynamic electricity pricing authored and presented at the Industrial and Commercial Use of Energy Conference in Cape Town, RSA in 2005.
- Completed operating modelling for a new ferroalloy production facility.

Period: December 1998 – December 2002

Employer: Samancor – Metalloys Works

Job title: Operations Manager – West Plant, Metalloys

- Plant Manager responsibilities in respect of output, plant maintenance, human resources, raw materials for an 81MVA submerged arc furnace and oxygen-blown convertor plant for the production of high carbon - and medium carbon ferromanganese alloys.
- Responsible for quality and logistics operation of the marketing of refined ferroalloys.
- Responsible for the commissioning of the refined ferroalloy production facility.
- Functioned on team undertaking the due-diligence study for a possible purchase of a manganese alloy producer in Mexico [operated with legal team from BNP Paribas based in Paris].
- Design of an Advanced Process Control (APC) system based on artificial intelligence technology [expert system, neural networks and fuzzy logic] for a submerged arc furnace.
- Presentation of a paper discussing the aspects of APC using artificial intelligence to the annual conference of the South African Management Scientists in 2001.
- Instrumental in the institution of the Eskom real-time pricing tariff for the Metalloys ferroalloy production facility.
- Rebuild of the 81MVA submerged arc furnace to install a 'freeze' lining to minimize the heat losses and optimize electricity consumption in the production of manganese alloys [Refer to paper presented at the International Ferroalloys Congress in Cape Town in 2004]. At the time this was ground-breaking application of this technology.
- Investigation of Demand Side Management (DSM) opportunities for a ferroalloy works in conjunction with an Energy Services Company (ESCO).
- Developed and instituted detailed reporting and tracking function for output and efficiencies [emphasis on energy efficiency] of operation of a ferroalloy works. Participation in annual wage negotiations.

Period: January 1995 – November 1998

Employer: Samancor – Metalloys Works

Job title: Technical Manager – Metalloys

- Participated in the commissioning of electricity generation plant utilising submerged arc furnace waste gas as a fuel.
- Participated in extensive operational data acquisition and study to optimise the waste gas feed to the electricity generating plant.
- Negotiation with Eskom [RSA electricity supply utility] for the implementation of a customised maximum demand independent electricity tariff for Metalloys to counter the negative economic impact of the waste gas electricity generation on the maximum demand profile of the ferroalloy production facility.
- Investigation into the feasibility of implementing the Eskom real-time pricing electricity tariff for the ferroalloy production facility [Nominated demand of 296MW].
- Co-authored a paper for the International Ferroalloys Congress in Beijing, China on the subject of submerged arc furnace 'freeze' linings. Much of the development was undertaken with UCAR in the USA.
- Responsible for the operational laboratory function.

- Technical responsibility in team directed to purchase and redesign CaC_2 [calcium carbide] production plant to produce manganese alloys [task included perusal and input into legal documentation of purchase].
- Participation in annual wage negotiations.

Period: July 1990 – December 1994

Employer: Samancor – Metalloys Works

Job title: Plant Manager – North Plant, Metalloys

- Plant Manager responsibilities in respect of output, plant maintenance, human resources, raw materials for two 75MVA submerged arc furnaces for the production of high carbon ferromanganese alloys.
- Functioned as member of Gencor Engineering Technologies team in design and tender evaluation for ferroalloy production plant in Saudi Arabia [Sabayek Plant].
- Operational responsibility for the design, installation and commissioning of a manganese alloy continuous casting machine for two 75MVA submerged arc furnace production units.
- Operational responsibility for the design, installation and commissioning of a venturi scrubber waste gas cleaning facility for two 75MVA submerged arc furnace production units.
- Investigate the optimal thickness of casting of liquid manganese alloys so as to minimize the internal stresses together with optimizing the heat losses from the molten alloy.
- Negotiation with Japanese companies regarding joint venture for the production of refined [low C] manganese alloys in South Africa.
- Completed financial models for the purchase of an alloy continuous casting machine for ferroalloy production.

Period: February 1989 – June 1990

Employer: Samancor – Metalloys Works

Job title: Plant Manager – West Plant, Metalloys

- Plant Manager responsibilities in respect of output, plant maintenance, human resources, raw materials for an 81MVA submerged arc furnace for the production of high carbon ferromanganese alloys.

Period: July 1987 – January 1989

Employer: Samancor – Metalloys Works

Job title: Production Manager – West Plant, Metalloys

- Production Manager responsibilities in respect of output, human resources, raw materials for an 81MVA submerged arc furnace for the production of high carbon ferromanganese alloys [responsibilities as for a Plant Manager but without the maintenance accountability].

Period: August 1985 – June 1987

Employer: Samancor – Metalloys Works

Job title: Production Superintendent – West Plant, Metalloys

- Additional operational responsibilities of the 81MVA submerged arc furnace including financial in respect of detailed production and capital project costing, together with the human resource function.

- Research & Development for the bottom pouring [using flow control valves] system of casting manganese alloys on a continuous casting machine.
- Undertook detailed study of logistics system for the transporting of manganese alloy to handling in a final product plant.

Period: January 1983 – July 1985

Employer: Samancor – Metalloys Works

Job title: Production Engineer – West Plant, Metalloys

- Detailed production responsibilities of an 81MVA submerged arc furnace [materials balances, electricity accounting, product handling, waste gas cleaning in a venturi scrubber plant].
- Heat loss from submerged arc furnace linings – study.
- Technical development of a plasma furnace for the remelting of high carbon ferromanganese fines [<6mm] in conjunction with the Austrian technology supplier. Energy inefficiencies as a result of vaporisation of manganese resulted in the technology being abandoned.

Period: July 1981– December 1982

Employer: Samancor – Metalloys Works

Job title: Assistant Metallurgist - Metalloys

- Development of data acquisition system for ferroalloy production facility.
- Mass and energy balances of ferroalloy production process.

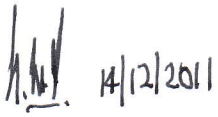
Period: March 1981 – June 1981

Employer: Samancor – Metalloys Works

Job title: Engineer-in-Training

- Worked on shifts as Production Engineer in the ferroalloy [manganese alloy] production process.

I, Anthony Michael Hearn, declare that the information given above is an accurate reflection of my professional experience, qualifications and professional accreditations.



AM Hearn

PrEng, CEM, CMVP, MBA, BCom, BSc Eng (Chemical), Dip. Datametrics(OR & Stats.)