

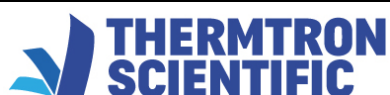
EXPERIENCE OF THE TS TEAM IN MAJOR PROJECTS



AUGUST 2014

YEAR	CLIENT	DESCRIPTION	TYPE OF WORK / EXPERTISE
1997 - 2000	Sasol Carbo- Tar	EPC of pilot facility (Unit 83) for the production of pure carbon from calcined coke using plasma technology at 2500 °C.	EPC; Technology development in shaft furnace & plasma fields; Maintenance.
1998	Sasol Carbo- Tar	Concept and basic design of rotary calcining kiln.	Concept and Basic design.
1999	Sasol Carbo- Tar	Extended basic design of a 60 000 tons per annum coke purification plant valued at 300 mR. This plant included the storage, screening and conveying of calcined coke, treatment at 2500 °C, cooling bagging and storage. Design included process, electrical, instrumentation, materials handling, plasma reactor design and mechanical design.	Project management of subcontractors; design.
2003 - 05	Innovation fund	Design, build and operate a pilot facility to distil TiCl ₄ and to produce 10 kg/h TiO ₂ using plasma technology.	Technology development in chlorine, plasmas & distillation; EPC, operation.
2003 - 05	Kumba	To design, build, commission and partially operate a radio frequency system for the drying of coal. (This was a THRIP project).	Design of power supplies & RF systems; technology development; project management.
2001 - 03	Metso Minerals, Sastech	Extended basic design of a 30 000 tons per annum coke purification plant valued at 240 mR. This plant included the storage, screening and conveying of calcined coke, treatment at 2500 °C, cooling bagging and storage. Design included process, electrical, instrumentation, materials handling, plasma reactor design and mechanical design.	Project management of subcontractors; EPC; involved plasma technology; materials handling.
2002	Sasol Carbo- Tar	Redesign and rebuild the Unit 83 pure carb reactor for less maintenance.	Mechanical design; construction; maintenance.
1999 - 2002	Innovation fund	Design, build and operated a titanium chloride pilot facility to produce TiCl ₄ for titania pigment production (20 kg/h size). This work was done in consortium with Mintek.	Chlorination; circular fluidised bed reactor.
2001	Sasol Carbo- Tar	Improve the plasma pilot system for the purification of coke from 2 x 99 kW to single 250 kW input power.	Design and manufacture plasma equipment.
2004	SAA	Design and build a 40 m ³ oven for the drying of materials in the aerospace industry.	Design; project management; oven expertise.
2005	Innovation Fund	Design, manufacture and commission a V-type plasma torch and power supply for the high temperature decomposition of zircon to plasma dissociated zirconia.	Mechanical design; construction; maintenance. Plasma; power supplies.

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2005	IST/ Westinghouse	Basic design of the vacuum system for the loading and unloading of the pebbles into the pebble bed modular reactor.	Vacuum design; process design.
2003	Murray & Robberts	Concept design, layout, risk analysis and costing for the construction of a 5 kg batch TRISO coating facility.	Concept design; high temperature hardware.
2003 - 07	PBMR	Turnkey supply of a 5 kg batch facility for the TRISO CVD coating of uranium oxide. The facility can run at least one batch every 12 hours. The facility included the coater reactor, feed systems, handling of nano-particles in the off-gas, water supply, 100 kW DC power supply, all instrumentation, control and electric supply and fire control system. The supply included basic design, HAZOP, detail design of all equipment, instrumentation and electric systems, preparation for the National Nuclear Regulator, manufacturing, construction and cold and warm commissioning and training.	Turnkey supply of a nuclear chemical plant: design; manufacturing; construction; commissioning; training.
2004	Kumba resources/ Exxaro	Concept development of a process for the conversion of zircon into high value zirconium chemicals. Laboratory development and engineering design and costing were done for a 10 000 tons per annum plant.	Technology development in high temperature, zircon, sodium hydroxide, sodium silicate. Concept design & costing.
2004	PBMR	Concept design of the pilot fuel plant CVD TRISO coated uranium oxide facility. This study evaluated the sharing of equipment for four reactors.	Time study on production; process design; electrical design.
2005	PBMR	Gas supply design for acetylene, propylene, argon and hydrogen and methyltrichlorosylane, fire protection design, design basis for civil and electrical designs of utilities for the CVD TRISO coating facility.	Explosive gas design.
2005 - 09	Innovation fund	Develop two processes on bench scale to convert calcium fluoride into carbon fluorides and hydrofluoric acid. This work is done in a consortium and Thermtron was responsible for the engineering, plasma systems and power supplies in the project.	Hydrofluoric acid, methane, carbon fluorides, plasmas, power supplies. Process design; mechanical design.
2005	Kumba resources	Design and build a continuous materials handling system for the drying of coal with a radiofrequency source.	Special conveyor system design & manufacturing.

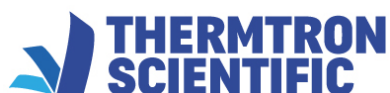
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YEAR	CLIENT	DESCRIPTION	TYPE OF WORK / EXPERTISE
2005	Gasrec (UK company)	Design of a high pressure (15 Bar (g)) cold finger, membrane and pressure swing absorption system to remove VCM's, water and CO ₂ from 2500 NM ³ /h landfill site gas. 3D models, process design, HAZOP, detail mechanical, pipe isometrics, instrumentation and electrical designs were included in the package. The design was done according to the European codes of PED and CE.	PSA; membranes; pressure vessels; process design; pipe isometrics; detail mechanical design; 3D models.
2005	Thermtron Projects	Design, supply, installation and commissioning of CO and oxygen off- gas analyzers for the CVD TRISO coating facility.	CO and oxygen in line analyzers design, installation and commissioning.
2005 - 09	Thermtron/ Exxaro/ Delphius consortium	Development of models and laboratory microwave and induction systems for the coking of coal.	Microwave technology; induction heating; theoretical modelling; coking.
2005	Kumba resources /Exxaro	Pre-feasibility study and costing (\pm 25%) of a plant for the drying of coal using RF technology.	Coking of coal; RF systems; DC power supplies; materials handling; water and utilities.
2005	Babcock	Concept design of the steam water and condensate system for a waste recycling plant.	Steam; water systems; condensate; literature studies; concept design.
2004 - 07	Dynamic instruments	Welding of instrument impulse lines for Tutuka power station units 1 to 6. The total amount of welds were more than 3000 over a three year period	Welding of small bore piping; on site welding and site management.
2006 - 08	PBMR	Concept, basic and detail design of three by 5 kg TRISO CVD coating facility. This design included process, mechanical, instrumentation and electrical designs. The design was delivered as a package in 17 files. The total instrumentation IO count was 1400. 3D layouts and manufacturing drawings of more than 30 equipment were delivered. Costing were done and the estimated capital cost (\pm 10%) on the plant was 125 MR.	Process design; HAZOP; mechanical design; instrumentation and electrical design; 3D models; TRISO coating; CVD; uranium handling; nuclear licensing assistance.
2006	Exxaro	Design and build a materials handling system for the drying of coal. This system work with a sliding motion.	Materials handling; construction; EPC.
2006	Exxaro	Design, build and commission a vacuum system for the dewatering of coal.	Vacuum; Materials handling; EPC.

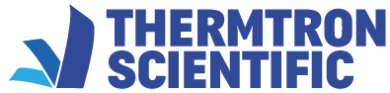
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2007-08	Exxaro	Design, construct and commission a 300 kW output radiofrequency (RF) power supply for the drying of coal. This include a high voltage (15 kV) direct current power supply (500 kW AC supply), RF converter, utilities supply and a materials handling batch system.	Direct current power supply; radiofrequency power supply; materials handling; EPC.
2006	Gasrec (UK company)	Manufacturing of pressure vessels in house and the construction of a pressure swing absorption and membrane cleaning plant for the purification of 2500 Nm3 per hour landfill site gas. This was done under the CE specification and was exported to the UK. The pressure was 15 Bar (g). The plant was built on skids inside 3 x 12 foot containers.	Pressure vessel manufacturing, instrumentation and electrical installation.
2009	Exxaro	Basic design and experimental verification of a continuous coal drying plant.	Basic design; technology development; EPC.
2006	IST Nuclear	Orbital welding of ribbed pipes for the transport of graphite spheres for the Helium Test Facility. The orbital welding were developed specifically for this type of pipes.	Orbital welding; new welding method development
2007-08	Exxaro	Upgrade of the RF powers supply unit from a natural oscillating system to a specific frequency driven system.	RF design and construction; EPC.
2006	Stefanutti and Bressan	Mechanical maintenance and construction of the inoperable coal screens on the Sasol Secunda site.	Mechanical maintenance; site management; rigging; construction; welding.
2006-07	Krisch-Wecam	The development of Internal bore welding of high pressure heat exchangers for powers stations.	Develop internal bore welding methods; internal welding of tubes.
2007 - 08	CSIR	Techno-economic study of the production of titanium metal (20 000 tons per annum) and titanium dioxide (100 000 tons per annum) using plasma systems	Process design; costing; titanium; titanium dioxide.
2007	Exxaro	Design, manufacture and install a 30 kW plasma system for the treatment of coal.	Plasmas; coal; water cooling.
2007	PBMR	Construction of a mechanical installation for the testing of the Air Test Loop for the nuclear industry.	Construction; welding.
2008	Exxaro	Consultation on the beneficiation of coal. Various projects are developed and concept design.	Process design; energy conversion; electrical generation.
2009	Sulphide Tech	EPC of a plant that produce elemental sulphur from calcium sulphate waste.	Project management; mechanical detail design and construction.

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2009	Western Utilities Corporation	Concept engineering: High temperature barium sulphate conversion process.	Concept engineering.
2013-14	Confidential Client	Conceptualization study of a High Temperature Nuclear Experimental Reactor for peaceful applications i.e. desalination, medical isotopes. Completed. Busy with next phase proposal – Concept Design. Total capital cost 3 Billion R	Desktop study
2014 - current	Confidential Client	Basic Design for a Si28 Mini plant	Project Management, basic design
2014 - current	Confidential Client	Basic Design for a Laser system	Project Management, basic design
2013- current	Confidential Client	Basic Designs for various Chemical plants for a Reactive control system for Satellites. Total capital cost 400 Million R	Consulting
2013- current	Confidential Client	Laboratory for Catalyst manufacturing, Total capital cost 10Million R	Consulting