

Sinotech

Sinotech CC specializes in the analyses and review of hydraulic and hydrology related engineering problems. The focus areas include: flood calculations, free surface flow assessment, flood lines and hydraulic structure analyses, model studies, network design and optimization, design of pumping systems and surge analyses of pipe systems.



Company Overview

Sinotech was formed in 1980 and has provided specialist input on numerous projects throughout the world. The acronym Sinotech stands for the following Afrikaans phrase: "Sentrum vir Ingenieurswese, Navorsing, Onderrig en Tegnologie" translated into English: Centre for Engineering, Research, Education and Technology. The team has great experience in solving complicated problems.

Personnel

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Experience:

34 years (academic and consultancy)

Qualifications & affiliations:

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Consulting services

Sinotech has been involved as a specialist consultancy firm for the past 28 years. The specialist services offered resulted in providing an input on numerous water projects throughout the world.



Services offered

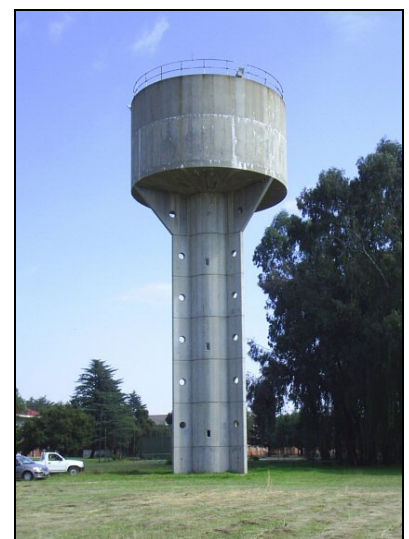
The Sinotech team has experience and can assist in the following fields:

Hydrology

- Flood calculations (deterministic, empirical and statistical methods)
- Risk assessment of flooding and flood line calculations
- Run-off determination
- Review of hydraulic structures

Hydraulics

- Pipeline design (structural, hydraulic, components and protection)
- Pipeline system optimization using genetic algorithm techniques
- Pipeline component design (valves, crotch plates and thrust blocks)
- Surge analyses (any scenario and any component)
- Pump station design and analyses (pump selection, pump scheduling and layout)
- Water distribution system design and analyses (layout, flow scenarios, pipe classes, hydrant positioning etc.)
- Water loss management
- Sanitation system design and analyses
- Storm water run-off modelling (flood routing, retention ponds, inlet structures)
- Free surface flow modelling (complex river systems, steady and unsteady flow, hydraulic jumps)
- Culverts and bridges
- Hydraulic design of spillways
- Model studies (pump inlets, free surface flow and hydraulic structures)



Asset management

- o Field investigations to establish the effect of operational variation
- o Flow measurements to establish mass transfer rates
- o Pressure measurements to determine the hydraulic characteristics and loss coefficients



Projects

Sinotech have provided specialist input for numerous local and international Consulting engineering firms, Government Departments and Water Boards. Some of these projects are listed below:

Organisation	Projects
Africon	Jumeira water supply system in Dubai. Assisting in assessment of pipe failures.
BKS	Assisting in various pipeline system analyses.
EVN	Assessment of dynamic pressures of the Majosi bulk water supply pipeline.
Golder Associates Africa	Phalaborwa De-watering system dynamic pressure evaluation.
Jaco Swart Consulting Engineers	Hydraulic assessment and surge analysis of the Blyde River Irrigation Scheme. Contract value of construction is R120 Million.
Kwezi V3 Engineers	Roodeplaat Dam to Wallmansthal raw water pipeline dynamic pressure analyses.
LawGibb	Hoxane bulk water transport pipeline. Surge and pipe optimization of booster pumping system.
MVD Consulting Engineers (South Cape)	Surge analyses, air valve and pipeline analyses (George Le Grande pipeline, Groot Brak Water supply scheme, Murraysburg pipeline, Pacaltsdorp Irrigation Scheme).
Ndodana Consulting Engineers	Review of various hydraulic designs and storm water systems analyses. These include Kimberley Airport, Storm Water Drainage System crossing the Katlehong - Kwesini railway section, T15 provincial road in Eastern Cape,
Ninham Shand Consulting Engineers	Air valve sizing and positioning analysis (3 m diameter Gurara Transfer Scheme). Maguga weir model study.
Nyeleti Consulting Engineers	Pipeline analyses and design reviews (Malematja Water Supply scheme).
Petronet	Surge analysis of the Petronet refined products pipeline from Durban to Sasolburg. Total distance of 780 km and 14 pump stations. In collaboration with Africon Pty Ltd.
Stewart Scott International	Dubaydib well field design of valve control system.
Rand Water	Surge analyses of the B4, B6 & B10 pipeline systems. Preliminary review of the Lesotho transfer pipeline (Surge analyses, Clarens pipeline 3,5 m diameter).
South African National Road Agency Limited (SANRAL)	Writing of the new Drainage Manual, 5th fully revised edition. Review of the N8 Kaalspruit River Bridge (Hydraulic and hydrological aspects). Hydrological and hydraulic analyses of the Tsitsa Low Level River Bridge
Vektor Ingenieurs	Far East Hospital and Tambo Memorial Hospital site water reticulation design
WRP Consulting Engineers	Conceptual design and sizing of the Khayelitsha pressure control system
WSP International Sweden	Hydraulic Analysis of the Zambezi River for the construction of the 2.5 km long Caia River Bridge. This included the review of previous studies, setting-up of hydraulic model, assessing various bridge options and scour analyses for the preliminary design report.

Model studies

Sinotech has been involved in constructing physical and numerical models for numerous pump station inlet structures and inlet towers.

Client	Description of model
Berg River Consultants	Berg River Project - Water supply to Cape Town, South Africa. Outlet works. (Flow rate = 220 m ³ /s) Scale – 1:20
BKS	Conceptual development and testing to resolve the failure of the Paris Dam inlet works: Vortex formation and pressure fluctuations in the inlet pipes
Ninham Shand	Model study of the Maguga dam regulating weir – Stabilisation of the releases
Rand Water	Model study of the Vortex Protection Measures at Vereeniging Pump Station (ER 2), Filter House 2 suction manifold (Flow in manifold between 3,4 and 4,0 m ³ /s). Scale - 1:13,5
SULZER SA	Grootfontein Pump station in South Africa, (Flow per pump = 2,1 m ³ /s – four pumps). Scale - 1:6,5 Problems were experienced since the commissioning of the pump station. The high wear on the pumps has been investigated before and model studies have previously been conducted to determine the probable factors that contributed to the pump failures.
SULZER SA	Ashkelon Seawater Pump station, Israel. (Flow per pump = 2,4 m ³ /s, five pumps modelled). Scale 1:8 In a pump station the three-dimensional flow regime in the sump can influence the efficiency of the pump and might even endanger its long-term operation. These flow conditions can be evaluated by conducting a model study with the objective to: - Evaluate the flow regime and vortex formation tendency in the screen and pump sumps - Evaluate the rotational characteristics of the flow as it enters the pump and - Investigate the velocity distribution in the pump shaft
SULZER SA	Sheikh Zayed Pump Station in Egypt, (Flow per pump = 8,5 m ³ /s – 7 pumps). Scale 1:10 The client's request was to: - Evaluate the flow regime and vortex tendency in the pump sump - Investigate the formation of vortices - Evaluate the influence of the turning vanes on the inlet flow conditions and the velocity profile in the pump.
SULZER SA	Chanza Pump Station in Spain, (Flow per pump = 3,33 m ³ /s – 6 pumps). Scale 1:11,5. These pumps are vertical risers with a double entry



Awards

The members of Sinotech have received various rewards recognizing their contribution to the civil engineering profession:

- The SAICE Water Engineering Award for the development of software and the contribution to technology transfer in the water field (2002).
- Research grants received from WRC and NRF.

Software development

During the last 10 years Sinotech have developed various useful software programs. The main aim of the developments was to fill the specific needs of the market. The Sinotech team have years of practical experience and have developed software applications such as:

- Air valve sizing and location software (Developed for Vent-O-Mat)
- Development of surge software to include the features of the three-stage air valve into the Surge2000 software (University of Kentucky, USA) in cooperation with Dr Wood.
- Developed a program for the external loads on buried pipes according to ISO 2978 for AC-Pipes (Pty) Ltd
- Development of software for the design of GRP pipes according to AWWA C950-95 for VECTUS PIPES
- Development of software for the determination of surge pressures in simple pipeline system for AC-Pipes (Pty) Ltd
- Life cycle costing software for pipelines (ASTPM)
- Pipeline thrust block design program
- Water distribution design optimization utilizing genetic algorithms
- Pipeline optimization utilizing genetic algorithms
- Flood hydrology software
- Simplified free surface flow analysis
- Culvert analysis software
- Economic evaluation software
- Utility Programs for Drainage (UPD)



The team also has excellent experience and knowledge in using:

- Surge 2000 - Surge analyses software
- HEC-RAS - River hydraulics modelling
- EPA SWMM - Storm Water Management Model
- EPANET - Water Distribution Modelling

Software to meet your specific need can also be developed. Please contact us to discuss your requirements.

Research

The members of Sinotech have been involved in various Water Research Commission projects. Some of these include:

Project title	Report number
Quantification the influence of air on the capacity of large diameter water pipelines and developing provisional guidelines for effective de-aeration	Volume 1: WRC nr 1177/01/03 Volume 2: WRC nr 1177/02/03
Review of factors that influence the energy loss in pipelines and the procedures to evaluate the hydraulic performance for different internal conditions	WRC nr 1269/01/06
The potential application of Genetic Algorithms in the water industry	WRC nr 1144/01/01
Application and conceptual development of genetic algorithms for optimization in the water industry	WRC nr 1388/01/05

Courses

During the last number of years the members of Sinotech have been involved in presenting numerous courses covering various aspects of hydrology and hydraulics. Below is a list of courses that have been presented and could be modified to suite:

Course	Description	Number of days
Free surface flow	The course focuses on the basic theory and practical applications of free surface flow. Aspects that are covered range from the basic theory of free surface flow, energy, momentum and continuity as well as the use of the popular free software package HEC-RAS. The HEC-RAS River Analysis System Software is demonstrated in performing one-dimensional hydraulic calculations such as steady and unsteady flow simulations. The capabilities of the software to analyse culverts and bridges, scouring at structures and dam break analysis are also demonstrated through practical examples.	2-3
Pumping station design	Discussion of the various hydraulic and mechanical aspects of pump stations that is undertaken during the planning and design phase. <ul style="list-style-type: none"> • Pump selection and dimensioning and layout • Discussion of good practice in pump station design. • Performing practical exercises of a pump station design. • Pumping principles and pipeline characteristics • Pump selection, type of pumps • Pipe work, valves and water meters • Sump design and super structures 	2
Transients in pipe systems	Transient flow assessment is a crucial part of the pressure class selection of pipes during the final design stage, preventing surge pressures, which in numerous cases results in pipe failures. Foreseen and unforeseen operational circumstances can result in undesirable pressure conditions that should be analyzed for new pipelines, assessment of the upgrading of existing systems and determining the influence and risk associated with planned operational changes. The use of the widely used Surge2000 computer software (www.kypipe.com) to analyze transients in pipe systems is covered and problems solved in workshop sessions.	3
Pipeline design	The course focuses on the practical applications of pipeline design. Aspects that will be covered range from the basic theory of pipeline design, installation of pipes, design of specials, optimization to the design of pumping system and the introduction to various applicable design software packages. A number of practical sessions are included in the course to acquaint participants with the application of the knowledge. Topics presented include: <p>Pipeline hydraulics:</p> <ul style="list-style-type: none"> - Pipe flow theory, losses and approach - Network analysis - Economic analysis, LCA and optimization of systems <p>Pipeline design:</p> <ul style="list-style-type: none"> - Material selection - Pipe class determination - Surface protection and lining systems - Corrosion - Structural analysis of pipes - Crotch plate, collar and wrapper design - Surge and water hammer <p>Pipeline component design:</p> <ul style="list-style-type: none"> - Air valves – Sizing and positioning - Isolating, Non-return and Control valves - Water meters - Thrust block and anchor block design - Chamber design <p>Pipeline installation, testing and operation:</p> <ul style="list-style-type: none"> - Laying and backfilling - Pipeline testing and rehabilitation - New technologies and control systems, telemetry 	5

Course	Description	Number of days
Flood calculations	<p>In past courses the focus was on extreme floods and design philosophies.... In this course it was decided to return to the basics and present a practical course on flood calculation methods. It is attempted to show the tips-of-the-trade.</p> <p>The course includes:</p> <ul style="list-style-type: none"> - Flood calculation methods (Statistical, deterministic and empirical)- - Theoretical and practical problems in the determination of catchment rainfall - Alternative methods for design flood estimation – empirical, statistical and process models. 	2
Water distribution modelling	<p>This course provides an introduction to the hydraulic modelling of water distribution systems. The basics of water distribution modelling are covered and all the different components of water distribution systems are discussed.</p> <p>EPANET is public domain software, which may be freely copied and distributed. EPANET is used as demonstration software although the basic principles taught are applicable to any water distribution modelling software.</p> <p>EPANET is a computer program that does hydraulic and water quality simulations of pressurized water distribution systems. It can perform single and extended-period simulations. EPANET tracks the flow of water in each pipe, the pressure at each node, the height of water in each reservoir as well as the concentration of a chemical concentrations throughout the network during a simulation period.</p> <p>The course covers the basic theory followed by practical computer sessions strengthening the material covered.</p>	2
Urban drainage	<p>This course provides an introduction to urban drainage. This is followed by an introduction to using EPA SWMM, for modeling the quantity and quality of storm water runoff produced from urban areas.</p> <p>The topics to be covered include:</p> <ul style="list-style-type: none"> - Project Setup - Constructing a SWMM Model - Setting the Properties of SWMM Objects - Saving and Opening Projects - Running a Single Event Analysis - Viewing Simulation Results - Simulating Runoff Water Quality - Running a Continuous Simulation 	3

How to locate us

We are situated at the University of Pretoria in the Department of Civil Engineering, Engineering tower block, rooms 12-21 and 12-20.

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Visit our website for more details:

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