

PROFILE:

ICS Industrial Consulting Services was first registered in South Africa in 1985, and later in Australia in 1991. The ICS engineering management consulting firm initially specialised in industrial engineering methods and techniques such as production quality management; sustained performance management; risk management and safety compliance; and infrastructure and industrial assets management and maintenance. Besides industrial engineering management consulting, ICS has developed expertise in the following six specialist areas:

- **Infrastructure condition assessments and infrastructure systems modelling.**
- **Infrastructure assets management and maintenance optimisation.**
- **Infrastructure assets management and maintenance training.**
- **Industrial assets condition surveys and industrial systems modelling.**
- **Industrial assets management and maintenance optimisation.**
- **Industrial assets management and industrial maintenance training.**

EMPLOYEES:

ICS Industrial Consulting Services is very particular in the employment of appropriately qualified and experienced people that are professional and have the essential expertise with regard to:

- **Applying the correct analysis methods and techniques based on a thorough understanding of the requirements.**
- **Giving the most appropriate advice that is based on correct theoretical knowledge and years of experience.**
- **Communicating with an organisation's management as well as with senior expertise, tradespeople, and operators.**
- **Understanding the specific needs and requirements of practical people based on their own broad experiences.**
- **Ensuring that the required services are efficiently and effectively delivered to a high level of quality and completeness.**
- **Maintaining contact and continuity of professional care and service delivery well after the completion of a contract.**
- **Ensuring that the client's information remains confidential at all times.**



COMMITMENT:

ICS Industrial Consulting Services

has a professional commitment to quality, and a cost benefit delivery of correct and complete assessments, surveys, systems models, and consulting services in regard to:

- **Infrastructure condition assessments using non-destructive evaluation (NDE) such as infrared thermography (IRT) and ground penetrating radar (GPR), for assets rehabilitation programming, predictive and preventive maintenance.**
- **Infrastructure assets condition assessment and integrity evaluation, including short-term defect corrective maintenance as well as longer-term preventive maintenance and assets rehabilitation programming.**
- **Infrastructure assets modelling, such as Pavement Management Systems modelling including development of Asset Condition Profiles (ACPs) and Maintenance Intervention Parameters (MIPs), as well as infrastructure asset maintenance budget optimisation and asset residual life assessment.**
- **Infrastructure maintenance contract management, ISO Quality Management Systems implementation, development of asset management plans, and Level of Service (LOS) delivery verification.**
- **Industrial plant and equipment assets pre-commissioning, commissioning, or post-commissioning integrity surveys and condition assessments, utilising non-destructive testing (NDT) methods such as infrared thermography (IRT) and ground penetrating radar (GPR).**
- **Industrial maintenance management and ISO Quality Management Systems, ISO Risk Management Systems, and Safety Management implementation, evaluation and control.**
- **Specifications development and review of construction as well as maintenance work for new or existing infrastructure and industrial plant and equipment.**
- **Project management of commissioning of new or refurbished infrastructure, through evaluation of project planning, programming, scheduling, as well as progress, cost evaluation and control.**
- **Project management of plant or system shutdowns through outage planning, programming, and scheduling, as well as cost evaluation and control.**
- **Evaluation and improvement of assets operations/maintenance specifications for Quality Management accreditation and Safety Standards compliance.**
- **Industrial asset condition assessment, and plant and equipment audits to assess operations and maintenance performance as well as development of performance measure for balanced scorecard benchmarking.**
- **Developing operation and maintenance procedures and work instructions for employee and contracted work groups.**
- **Optimisation of production processes (manufacturing, process, and mining) through select industrial engineering techniques such as work cycle time reduction, maintenance optimisation, capability maturity development, and production productivity improvement.**
- **Specialist training in infrastructure asset management and maintenance with specific application of assets systems modelling, development of Asset Condition Profiles (ACPs) and Maintenance Intervention Parameters (MIPs), assets condition assessment and integrity evaluation, short-term defect corrective maintenance as well as longer-term preventive maintenance and assets rehabilitation programming.**
- **Specialist training in Industrial asset management and maintenance, asset quality management, risk management, as well as safety management systems implementation, evaluation and control to achieve the essential benefits of industrial assets reliability, availability, maintainability, and safety (RAMS).**

SPECIALISATION:

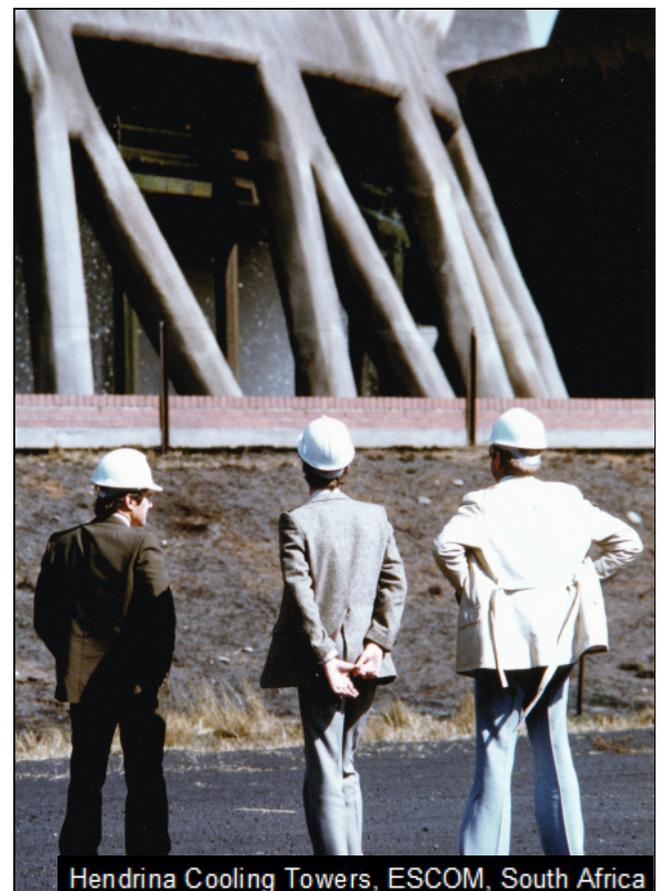
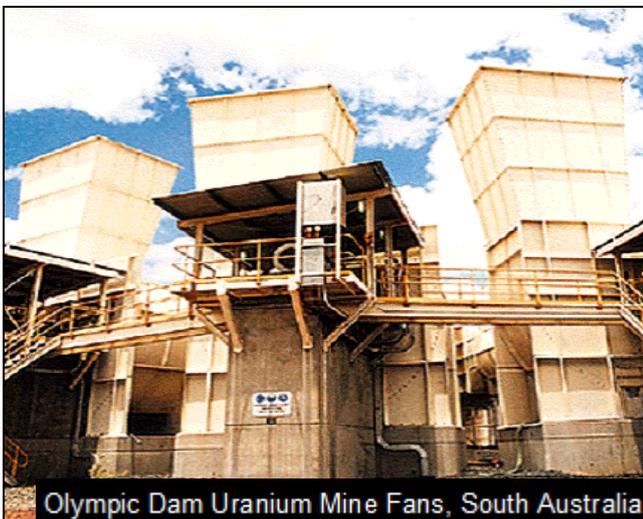
ICS Industrial Consulting Services is grouped into several distinct fields of specialisation relating to civil, mechanical, and industrial engineering:

● Infrastructure and Industrial Assets Integrity and Condition Assessments:

ICS specialises in assets integrity surveys and condition modelling and analysis; design evaluation and configuration management; assets standard operations, maintenance, and rehabilitation specifications and review; assets life cycle deterioration assessment and modelling; assets condition profiles and maintenance intervention parameters audits and review; and assets whole-of-life costing.

This includes the following;

- assets design functional analysis;
- design configuration management;
- performance specifications criteria;
- engineering design integrity criteria;
- condition monitoring/measurement;
- assets condition integrity modelling;
- assets distress condition modelling;
- deterioration/rehabilitation life cycle;
- maintenance optimisation modelling;
- asset preventive maintenance models;
- asset rehabilitation treatment selection;
- assets rehabilitation/disposal strategy;
- assets reliability evaluation modelling;
- assets condition profile development;
- maintenance intervention parameters;
- assets whole-of-life costing analysis.



● **Infrastructure and Industrial Assets Management and Specification Review:**

ICS specialises in technical specification review and audit of infrastructure and industrial assets management through assessment of assets strategic, tactical, and operational planning, with overall reference to the IIMM, TAM, APCC, CIEAM, and PAS55 specification frameworks.

This includes the following;

- asset management strategy plans;
- strategic goals to actions alignment;
- asset procurement/leasing strategy;
- asset rehabilitation/renewal strategy;
- asset disposal/replacement strategy;
- developing asset management plans;
- asset operations/maintenance plans;
- asset performance monitoring plans;
- asset management enablers/controls;
- asset usage life cycle/level of service;
- level of service/performance measure;
- asset capacity/actual usage utilisation;
- determining asset capacity measures;
- determining asset condition measures;
- determining asset replacement costs;
- determining asset depreciated values;
- determining asset service dependency;
- determining asset budget/actual costs;
- analysing asset data and information;
- analysing asset reliability diagnostics;
- analysing asset level of service risks;
- analysing asset risk/reliability criteria;
- analysing asset use/availability criteria;
- analysing asset maintainability criteria;
- developing asset usage/safety criteria;
- analysing asset usage life cycle costs.

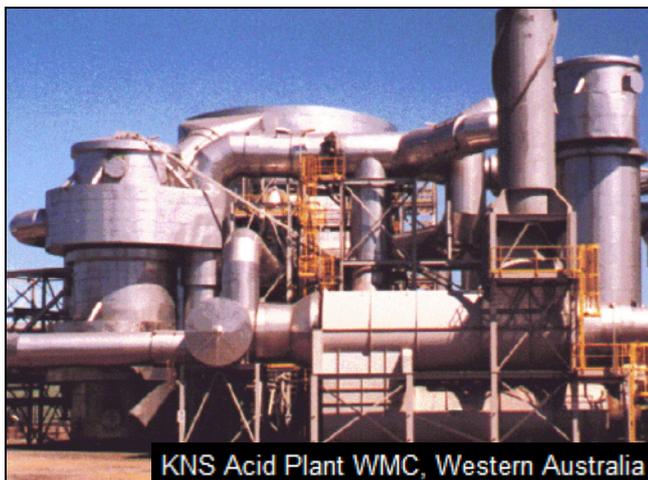
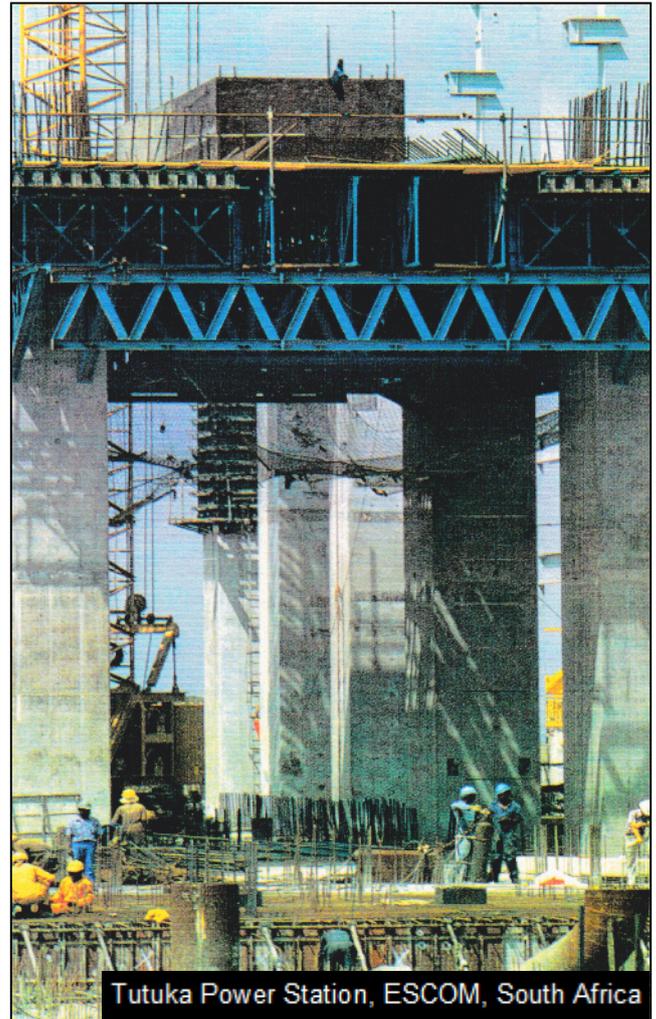


● **Industrial and Industrial Infrastructure Assets Commissioning Management:**

ICS specialises in the management and control of commissioning industrial and industrial infrastructure assets through commissioning project programming and scheduling, as well as commissioning contractor management and cost control.

This includes the following;

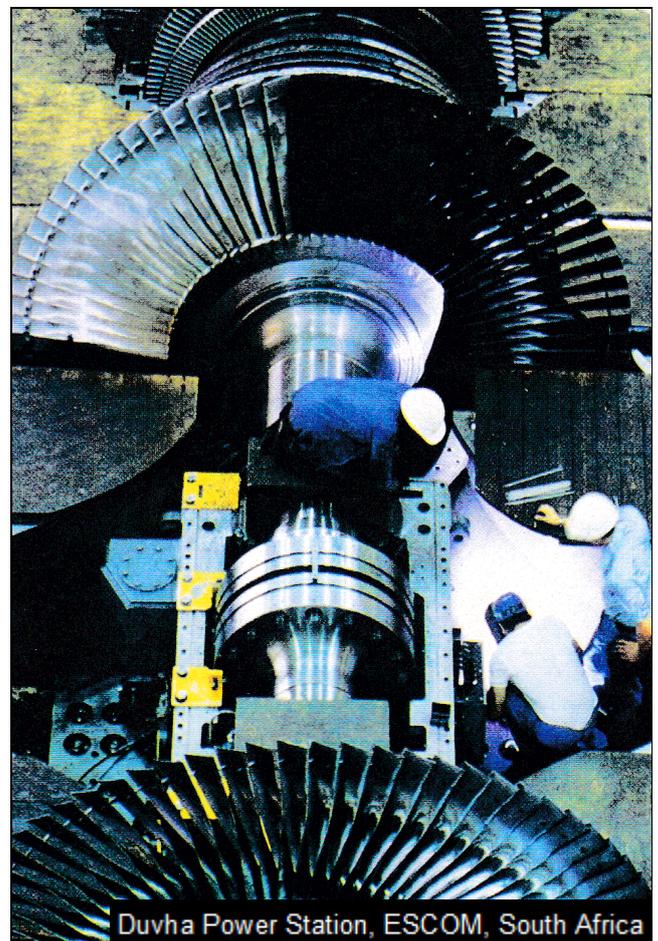
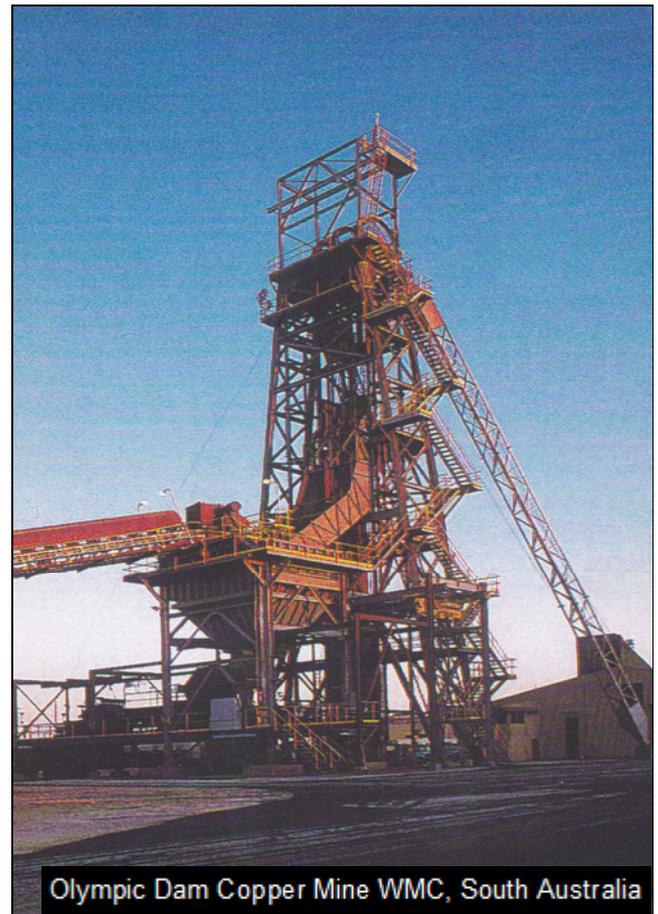
- process systems structuring;
- plant and equipment codification;
- systems and equipment functions;
- systems and equipment performance;
- identification of asset function failures;
- identification of asset failure condition;
- identification of asset failure causes;
- identification of asset failure effects;
- quantifying outage/downtime costs;
- quantifying the probability of failure;
- quantifying the risk of assets failure;
- quantifying the risk of safety hazards;
- determining consequential damage;
- developing functional fault charts;
- developing failure diagnostic charts;
- analysing condition monitoring data;
- analysing condition measurement data;
- developing asset reliability diagnostics;
- developing routine maintenance tasks;
- developing preventive maintenance;
- developing asset availability schedules;
- developing operations specifications;
- developing asset maintainability charts;
- developing maintenance procedures;
- developing asset safety procedures;
- developing standard work instructions.



• **Assets Operations and Maintenance Specifications Development:**

ICS specialises in systems modelling of reliability, availability, maintainability and safety of *existing* infrastructure systems as well as industrial plant and equipment, for developing comprehensive operations and maintenance specifications including the following;

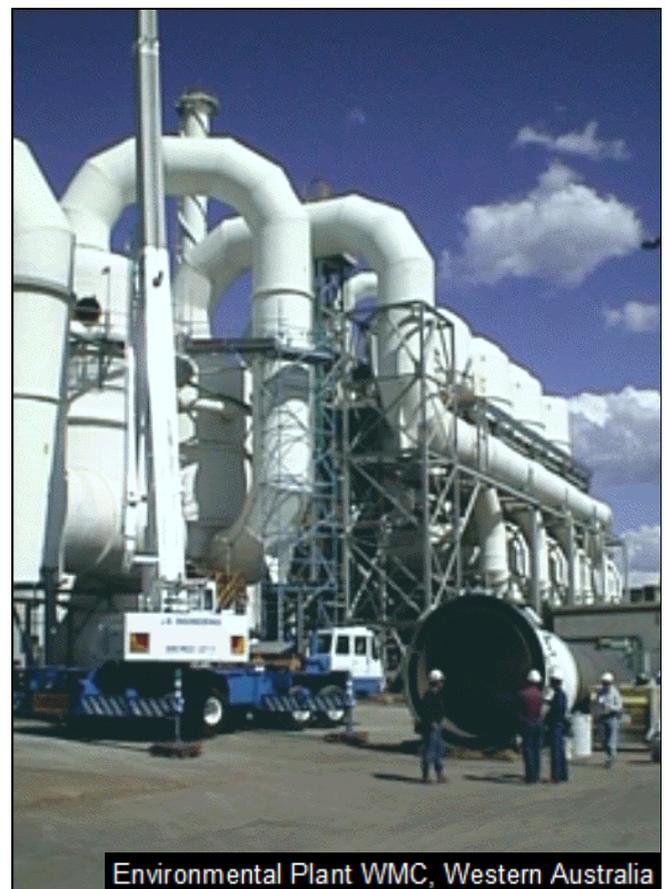
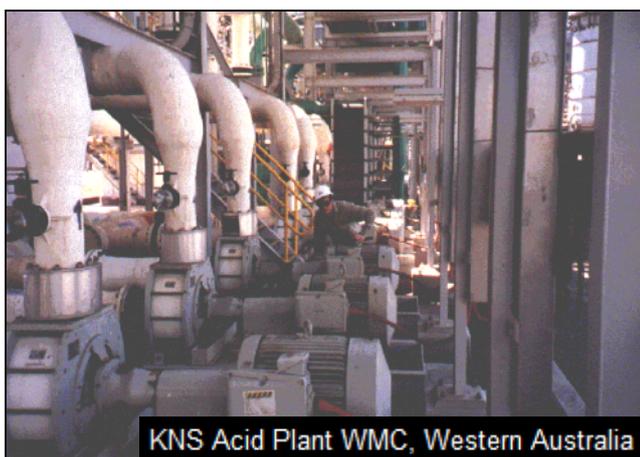
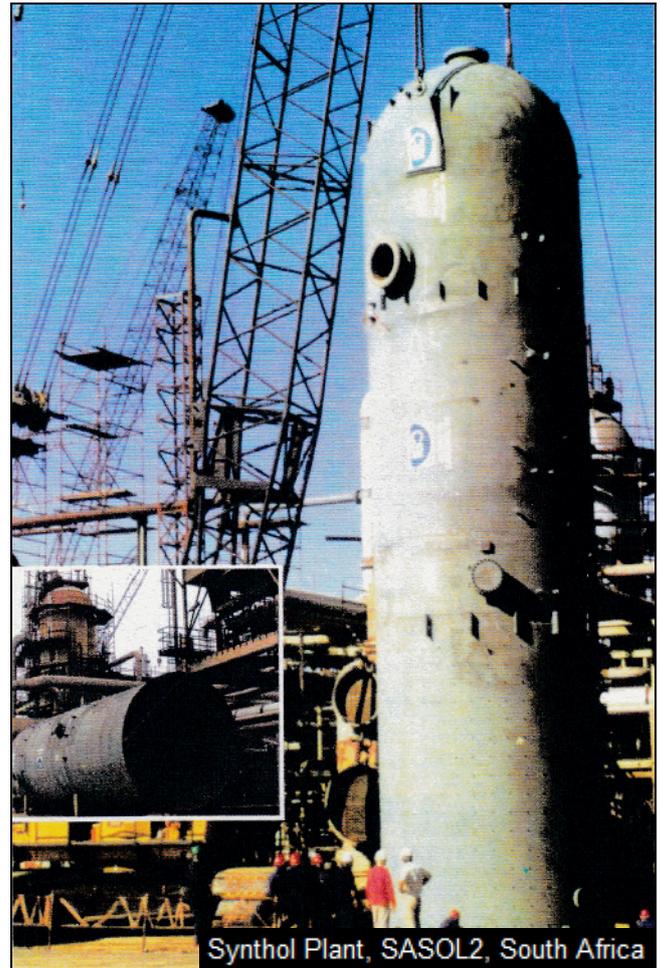
- process systems structuring;
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- identification of asset function failures;
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- identification of asset failure effects;
- identification of failure consequences;
- quantifying the probability of failure;
- quantifying the risk of assets failure;
- quantifying the risk of safety hazards;
- determining consequential damage;
- developing functional fault charts;
- developing failure diagnostic charts;
- analysing condition monitoring data;
- analysing condition measurement data;
- developing asset reliability diagnostics;
- developing planned maintenance tasks;
- developing asset availability schedules;
- developing operations specifications;
- developing asset maintainability charts;
- developing maintenance procedures;
- developing asset safety procedures;
- developing standard work instructions;
- compiling assets operations manuals;
- compiling assets maintenance manuals.



● **Plant and Equipment Outage Planning, Programming, Scheduling and Control:**

ICS specialises in systems modelling of industrial assets shutdowns and outages through evaluation and review of plant and equipment shutdown and outage project planning, programming and scheduling, as well as progress and cost evaluation and control, including the following;

- shutdown planning and programming;
- plant shutdown contingency planning;
- plant shutdown/outage initialisation;
- pre-shutdown inspections and audits;
- pre-shutdown requirements planning;
- shutdown task grouping prioritisation;
- duration evaluation of shutdown tasks;
- pre-scheduling of short-interval tasks;
- shutdown spares requirements plans;
- shutdown cost forecasts evaluation;
- shutdown work process flow charting;
- shutdown progress impact evaluation;
- shutdown safety compliance audits;
- shutdown outage/downtime costing;
- post-shutdown start-up initiation plan;
- post-shutdown start-up programming;
- post-shutdown inspections and audits;
- post-shutdown review and assessment;
- post-shutdown costs review reporting;
- developing plant maintainability charts;
- developing shutdown tasks schedules;
- developing shutdown safety schedules;
- compiling pre-shutdown audit manuals;
- compiling shutdown tasks manuals;
- compiling shutdown safety manuals;
- compiling shutdown spares manuals;
- compiling shutdown start-up manuals.

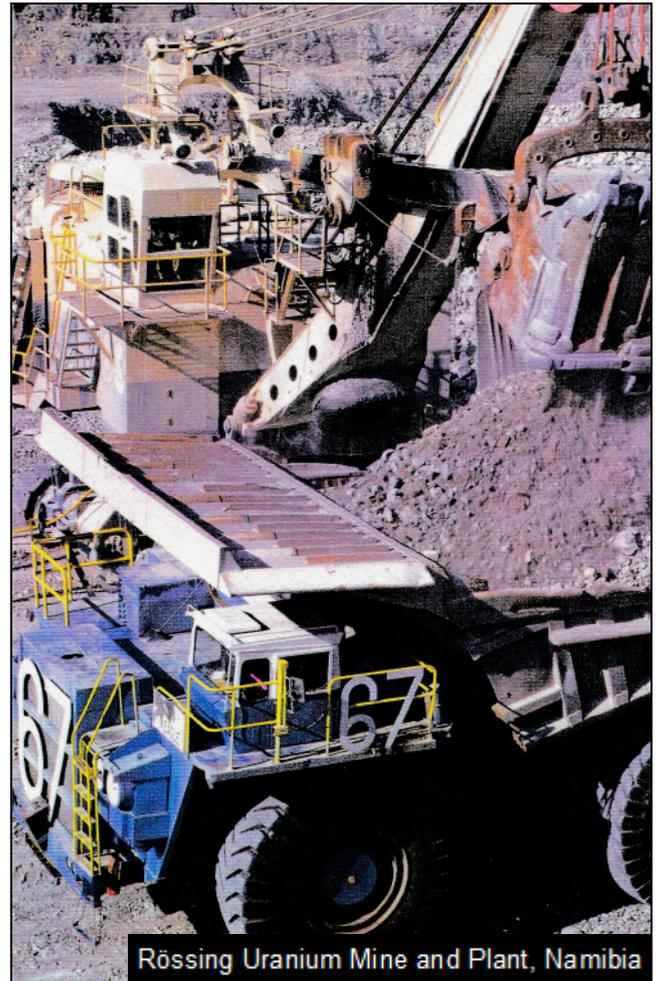


● **Optimisation of Production Processes Productivity, Scheduling and Control:**

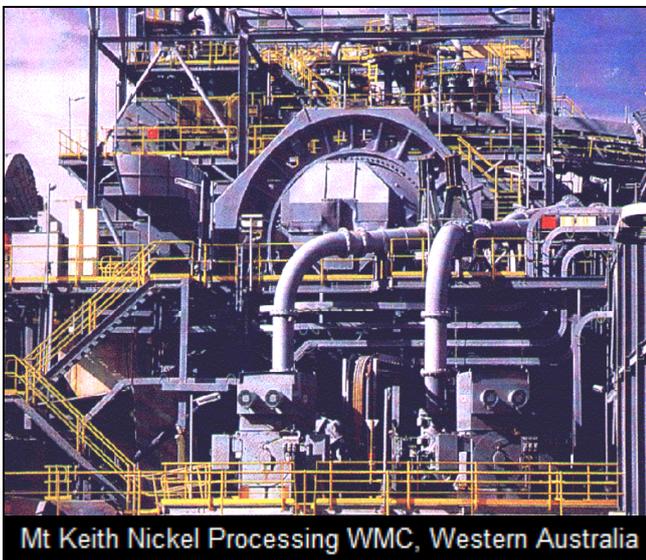
ICS specialises in systems modelling of industrial production processes through the application of industrial engineering methods and techniques for production and process productivity improvement, as well as the optimisation of production and operations control and related costs.

This includes the following;

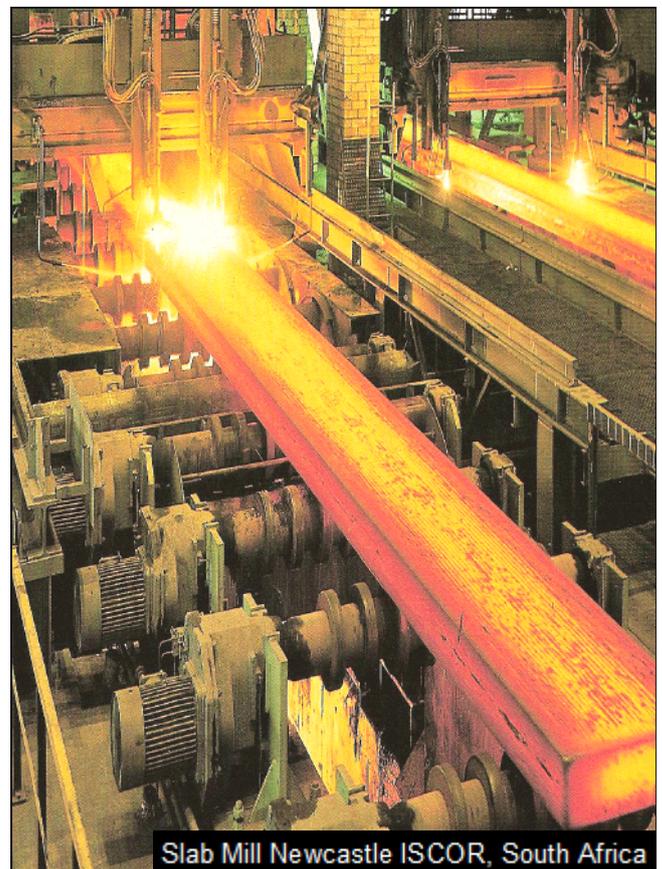
- production procedures and systems;
- plant production planning and control;
- materials control and standardisation;
- work quality control and improvement;
- work activity and cycle time measures;
- material handling cycle time reduction;
- activity motion and task method study;
- contractor performance measurement;
- work productivity incentive schemes;
- operator/asset equipment interactivity;
- manufacturing processes optimisation;
- plant/equipment operation optimisation;
- work/production optimisation planning;
- short-interval scheduling optimisation;
- production/maintenance coordination;
- production outage minimisation plans;
- risks and safety compliance programs;
- loss control and accident investigation;
- equipment damage control programs;
- production layout design optimisation;
- plant availability improvement program;
- plant maintainability optimisation plans;
- production layout design improvement.



Rössing Uranium Mine and Plant, Namibia



Mt Keith Nickel Processing WMC, Western Australia



Slab Mill Newcastle ISCOR, South Africa

CONTRACTING:

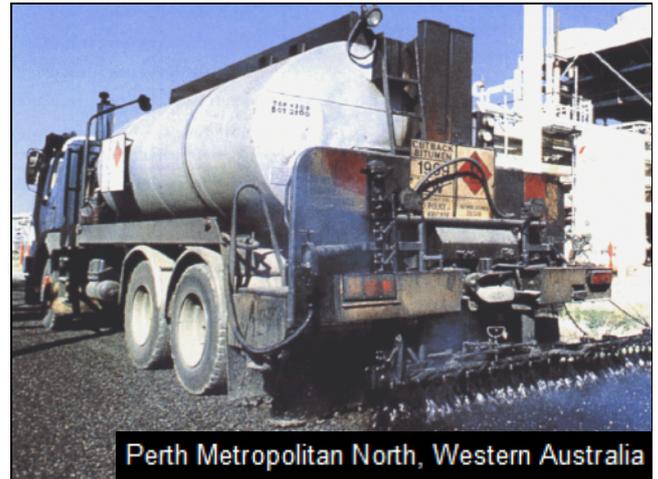
ICS Industrial Consulting Services specialises in technical assessments and audits and reviews of performance-based maintenance contract management for infrastructure as well as industrial assets, especially roads and bridges, buildings, and ancillary industrial structures.

• **Infrastructure Assets Maintenance and Assets Integrity Management Reviews:**

ICS specialises in technical assessments of contracted maintenance management performance, as well as audit and review of assets condition integrity and assets integrity management through assets condition surveillance, assets distress condition and deterioration modelling, and whole-of-life assets maintenance.

This includes the following;

- road networks contract management;
- short-term road defects maintenance;
- rural road environmental management;
- road/highway verge vegetation control;
- asset condition scoping and surveys;
- asset distress condition measurement;
- asset distress condition data analysis;
- application of asset condition profiles;
- maintenance intervention management;
- asset deterioration/rehabilitation plans;
- asset preventive maintenance strategy;
- asset rehabilitation treatment planning;
- asset rehabilitation work programming;
- cost-effective rehabilitation application;
- rehabilitation work budget optimisation;
- asset whole-of-life maintenance plans.



Perth Metropolitan North, Western Australia



Perth Rural North, Western Australia



Perth Metropolitan South, Western Australia



Perth Metropolitan South, Western Australia

TRAINING:

ICS Industrial Consulting Services offer specialised training in infrastructure as well as industrial assets management and maintenance to a very wide range of organisations, designed for managers, engineers, technicians and trades people.

• **Infrastructure Assets Management and Maintenance Training:**

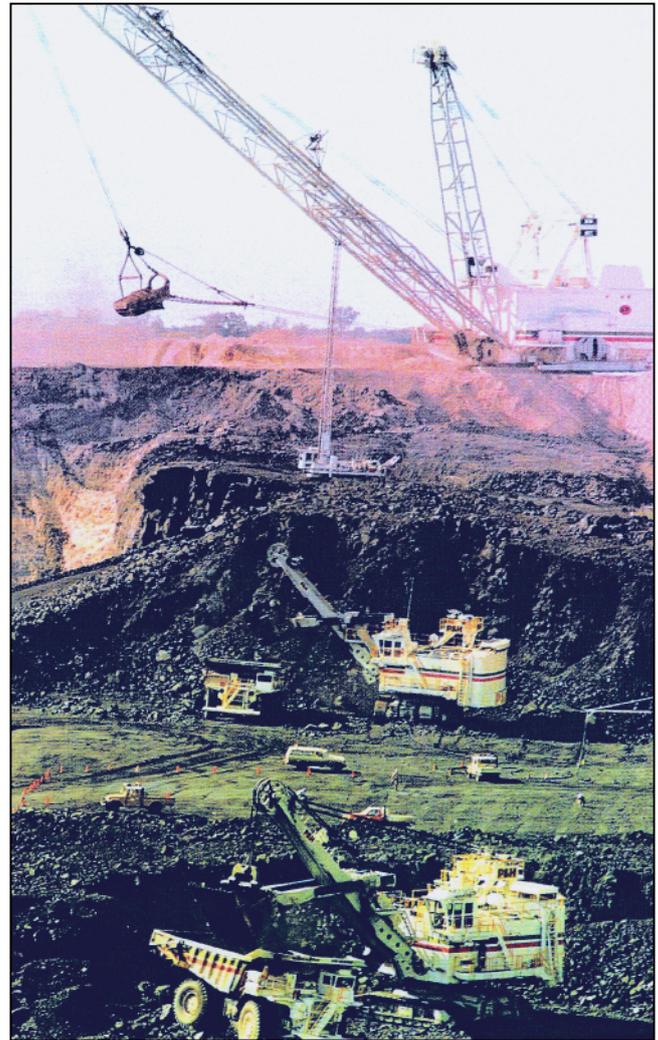
ICS offers workshops in infrastructure assets management and maintenance that include the following;

- infrastructure level-of-service models;
- infrastructure asset condition models;
- infrastructure condition assessments;
- asset condition scoping and surveys;
- asset distress condition measurement;
- asset distress condition data analysis;
- application of asset condition profiles;
- maintenance intervention parameters;
- asset maintenance optimisation plans;
- asset deterioration/rehabilitation cycle;
- asset deterioration/rehabilitation plans;
- asset preventive maintenance strategy;
- asset rehabilitation treatment planning;
- asset rehabilitation work programming;
- asset whole-of-life maintenance plans.

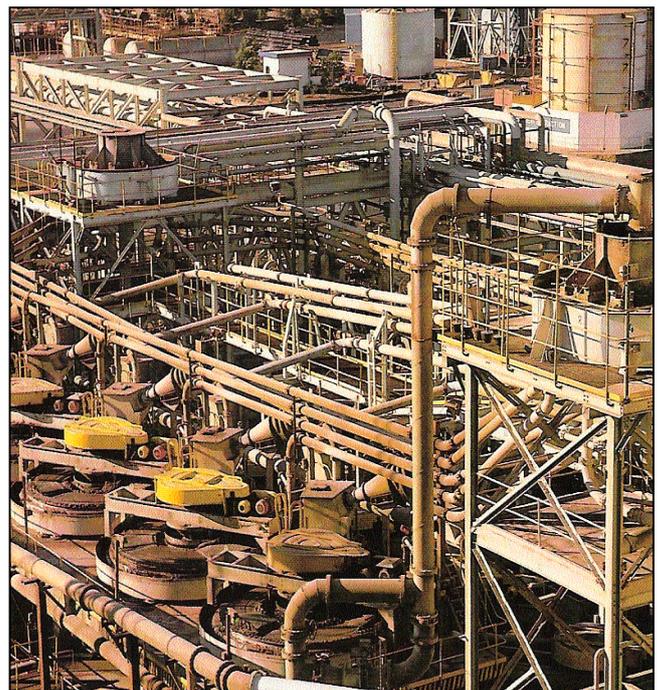
• **Industrial Assets Management and Maintenance Training:**

ICS offers workshops in industrial assets management and maintenance that include the following;

- industrial assets performance models;
- condition monitoring data acquisition;
- condition measurement data analysis;
- industrial assets functionality analysis;
- industrial assets failure mode analysis;
- failure mode effects criticality analysis;
- industrial assets reliability evaluations;
- industrial assets availability measures;
- industrial assets maintainability audits;
- assets technical specifications review;
- establishing maintenance procedures;
- asset preventive maintenance strategy;
- asset routine maintenance application;
- asset defect maintenance application;
- industrial assets safety assessments.



Blair Athol Coal Mine CRA, Queensland Australia



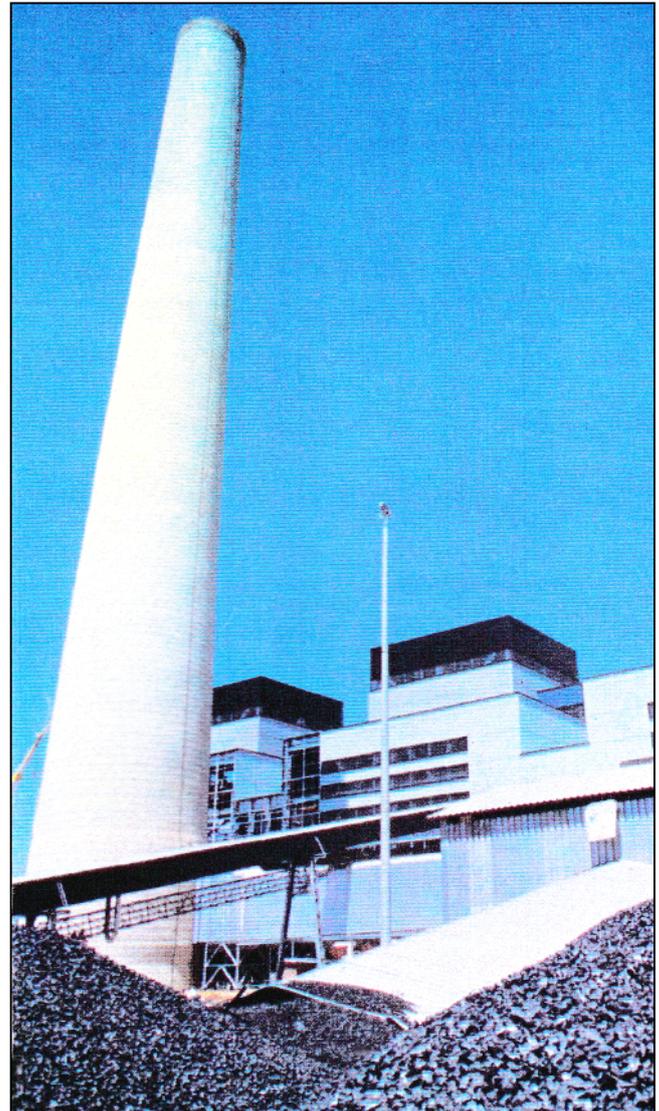
Rössing Uranium Processing Plant, Namibia

EXPERIENCE:

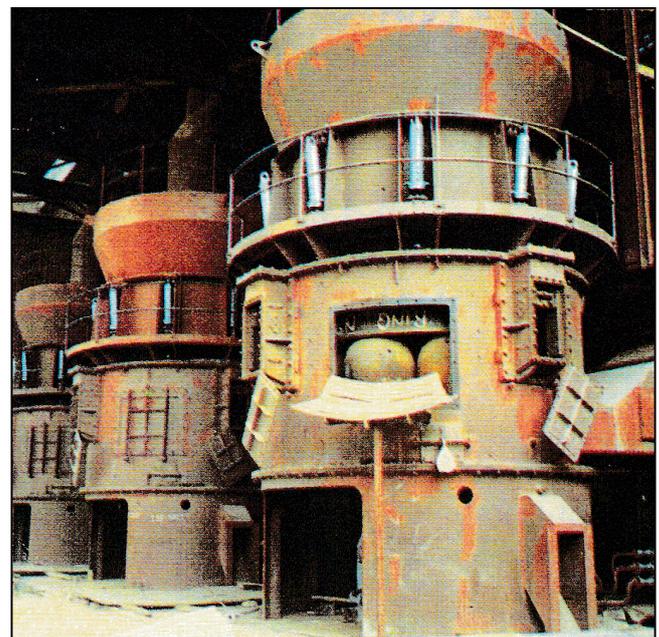
ICS Industrial Consulting Services has an extensive record of infrastructure and industrial assets consulting in regard to specialised activities such as systems modelling, asset management, and asset management and maintenance training for many different types of construction works, mining operations, production and manufacturing processes, as well as process plant and equipment operations and maintenance. These activities relate to roads and ancillary infrastructure, surface and underground mining, utility industries, transport systems, production and manufacturing industries, process plant, process mills, heavy engineering works, metal smelting and casting plant, minerals refineries, petroleum refineries, and power generation stations.

ICS's specialised systems modelling and consulting activities include;

- asset condition scoping and surveys;
- infrastructure condition assessments;
- infrastructure condition data analysis;
- infrastructure condition data modelling;
- application of asset condition profiles;
- maintenance intervention parameters;
- asset maintenance optimisation plans;
- asset deterioration/rehabilitation plans;
- asset preventive maintenance strategy;
- asset rehabilitation treatment planning;
- asset rehabilitation work programming;
- asset whole-of-life maintenance plans;
- industrial assets performance models;
- condition monitoring data acquisition;
- condition measurement data analysis;
- industrial assets functionality analysis;
- industrial assets failure mode analysis;
- failure mode effects criticality analysis;
- industrial assets reliability evaluations;
- industrial assets availability measures;
- industrial assets maintainability audits;
- assets technical specifications review;
- establishing maintenance procedures;
- industrial assets planned maintenance;
- industrial assets routine maintenance;
- industrial assets defect maintenance;
- industrial assets safety assessments.



Kriel Power Station Coal Plant ESCOM South Africa



Duvha Power Station Coal Mills ESCOM South Africa

CLIENTS:

ICS Industrial Consulting Services has been contracted by many different companies for specialised consulting, asset management, and maintenance training. Some of the major companies include:

◆ Africa and Australia:

Anglo American Gold – one of the largest gold producing corporations in the world, with the deepest mines in the world.

BP, Caltex, Shell, – multinational petroleum and petrochem refineries have contracted ICS for specialised consulting and training.

Escom – the largest single power utility authority in the world with several large 6x660MW units coal-fired power stations.

ISCOR – the largest steel producer in Africa including *Sishen* one of the largest open pit iron-ore mines in the world.

Rössing Uranium – the largest uranium mine and process plant in Africa, and one of the largest in the world.

Sasol – consisting of the largest fossil fuel to petroleum refineries in the world.

Alcoa of Australia – the largest alumina producer in Australia.

Anaconda Nickel – the largest single mining operations and process plant of laterite-to-nickel in the world.

BHP Billiton – the largest mining conglomerate in the world with the largest iron ore and steel manufacturing plants in Australia.

CRA/Rio Tinto – one of the largest mining corporations in Australia and in the world, with coal mining operations such as Blair Athol Coal, the largest steam coal exporter.

Main Roads Western Australia – the most extensive infrastructure assets management and maintenance contracts in Australia.

Pasminco – the largest zinc mining and refining operations in Australia.

ICS has also been contracted for systems development projects by the Australian Federal Government funded **Cooperative Research Centre for Infrastructure and Engineering Asset Management (CIEAM)**.

